A Review On Different Techniques for Path Tracking in VANET

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Abstract: ***VANET is vehicular ad-hoc network. As we know the traffic and accident is the major problem on the Urban Roads. Various vehicle due to various visibility hindrances encounters problems like accidents or traffic Jams. Various researches are being done in the VANET. This research is in the direction of path identification. This path identification is done using various types of stationary and moving or Arial wireless devices. These devices help in making vehicles to inter communicate with each other. So that vehicle while having low visibility can track the route as well as communicate to other vehicles. Various researchers have put aerial vehicle like UAVs. Which can provide the communication direct to the vehicle while there is direct hindrance on the road. Various robust techniques like Genetic based techniques and Neural network based are used.***

Index Terms - UAV, VANET, Genetic.

I.INTRODUCTION

1.1 VANET: Vehicular Ad-hoc Network (VANET) is ad hoc network that is categorized under MANET and has a significant role in short ranged networks. With increase in road traffic the chance of accidents have become very common and therefore an Intelligent Transportation System was developed, keeping this problem under consideration VANET came into existence in year 2000. Making safe road for driving and avoiding hazard situation as much possible it is due to safety protocols provided in VANET.VANET is combination of nodes i.e. vehicles which moves freely in various directions and they are connected with each other via communication link thus it forms a network. The position of vehicles is dynamic. Roadside units are established in which works to provide internet connections to the moving vehicles and connect vehicle on farthest distance to connect with each other and pass messages as well as receive, roadside units are providers of wireless communications to connect those vehicles in which connection is not possible. Video streaming, ecommerce services, speed sensors, weather services, live television services etc. Infrastructure is not fixed in VANET and each vehicle may have variation in speed and position. Vehicles are equipped with trans receiver so that they may communicate with other vehicles and RSUs i.e. Road Side Units. In VANET two types of communications are there; V2V i.e. communication between vehicle and other vehicle and V2I (Vehicle to Infrastructure) or V2R (Vehicle to Roadside unit). Various automobile companies are investing in development of VANET along that various research communities are working to develop advance techniques to enhance communication. Unbreakable and reliable communication is the key factor which is the main concern of these researches. Various functions are embedded in vehicles making it more applicable for users and VANET is made more advanced. These features include traffic jam area information, fuel outlets available, mechanics available nearby, cafes, restaurants, hotels, motels, schools, navigations, vehicle global positioning System (GPS). The movement of vehicles is very fast hence breakage of connections in very common, researches are focused on making reliable connections. In some cases, there may be hindrance in the communications due to buildings or other reasons. VANET is categorized under the Mobile Ad-hoc Network. Each node is can move freely and is infrastructure free. Government has allocated 5.9 GHz frequency for communication in short ranged networks. Various routing protocols are developed for beakless communication and making VANET working more smooth.

1.1.1 V2V: Vehicle to Vehicle communication between one vehicle with the other vehicle. In V2V vehicle communicate with vehicle in range of vehicle. If vehicle want to communicate with the farthest vehicle to achieve some information, then that vehicle have to adopt some technique that is by keeping other vehicle as an inter- mediator, inter-mediator conveys the message from source to destination.

1.1.2 V2R: Vehicle to RSU i.e. Roadside unit is communication between vehicle with roadside unit. When vehicle want to connect with internet server to access services then roadside unit serves vehicles with services. Accessing information from the other roadside areas from faraway vehicles it can only be possible through roadside units, that information may be traffic information, accident or hazardous conditions, file transferring between vehicles and many more. Roadside Units can also help in finding network or route delivery in case whenever it is required. Roadside unit is also called infrastructure of the VANET that is the reason that it is also referred as Vehicle to Infrastructure communication.

UVAR: VANET is getting advanced day by day therefore with the advancement of technology and safety of people is getting more secure. VANET being a special kind of MANET include moving vehicles that create a large size of Network. Challenges are to develop effective and efficient protocol for routing in VANET for reliable communication that provide unbreakable connection among vehicles. Although there are two types of communications available in VANET that are V2V and V2R since there is cause of hindrance in the communication and that problem is due to the hindrance caused by the buildings which are very huge in size causing connection breakage between Road side units (RSUs). This problem is not common in small cities where there is less traffic density and no hindrance this is frequently caused in urban cities and link stability is less in that area. Therefore, solution to this problem is very necessary. Various protocols are established but they do not have direct impact on obstacles caused in connectivity and performance. In UVAR the solution to this problem is given. UVAR is abbreviation for Unmanned Aerial vehicle (UAV) assisted Vehicular Ad-hoc network in which UAV is used as an intermediate or message conveyer between the vehicle and the vehicle. In UVAR the focus in to develop break less connection technique in which UAV is intersection node which can move freely over the roads in some predefined path in which it can have maximum energy efficiency and have to travel shortest distance. UAV send hello message to all the vehicles on the road and vehicles reply UAV with reply message, UAV comes to know about the connected nodes which are able to communicate with in the specific area and make a tables of connected nodes. In case when there is hindrance in between any two vehicles then UAV works as an intermediate in between those two nodes. UVAR protocol is

based on connectivity of the vehicles and traffic density i.e. UAV will move in the direction where the density of the traffic is more and it helps UAV to place itself on the position where there is maximum traffic coverage and connectivity based on the connectivity tables in which connected nodes and their respective distances are given. The motive of approach is to find fastest and best shortest path among the available other alternatives. Deducting the most connected nodes the best score is calculated but in case of sparse populated area the UAV works as the node forwarder in other case it works as data packet transmitter. UAV is equipped with GPS i.e. Global Positioning System along with it has in build maps of given area and grid location System is used to check the position of the nodes same is the equipment of vehicles therefore it becomes easy to locate and sense the position as well as we can get the overview of that particular area where vehicles are moving. Table of connected nodes is updated by UAVs time to time, battery of UAVs are always enough for the communication from Vehicle to UAV and UAV to Vehicle. Every UAV covers four roads segments and new fields are added in hello packet to know the connected nodes so that vehicles at intersections could make correct decisions.

1.2 UVAR Architecture

Architecture of UVAR consists of vehicles, UAVs and Roadside units (RSUs). There are three types of architectures in UVAR protocol:

1. V2V (Vehicle to vehicle) communication: Vehicles can communicate with each other as they are equipped with trans receivers but when there is obstacle or the street they are driving is different in that case we have to use some intermediate medium in the way in that case UAV is used as the message forwarder .UAV connects to the vehicle and making a communication way by sending hello message vehicle send the message to the UAV and UAV forwards the message to the vehicle for which the message was to be send.
2. V2R (Vehicle to Roadside unit) communication: Roadside unit to Vehicle communication is established when the information is needed that is based on Internet services. Roadside unit is equipped with satellite communication system having the capability to receive telecommunication systems and route discovery directories in case of situation when it is requested to find best route. Tracking a vehicle can be possible by connecting to the roadside unit.
3. V2U (Vehicle to UAV) communication: Flying high in the sky UAV communicate with the vehicles because its range is high and no obstacles can disconnect the UAV with vehicles, no human interactions are needed for flying of vehicle therefore range is assumed very large for the communication among UAV to vehicles and vehicles to UAV(U2V/V2U), The communication among vehicles and UAV is dependent on the best score in the specific intersection. If the score in another intersection is best and no connected segment present, then that segment is selected.

   Degree of connectivity is calculated by some mechanism which is centralized and which is only between the UAVs. UAVs keep sending hello messages to the vehicles and vehicles keep sending back the replies and UAVs come to know about the position of the vehicles and the connectivity ratio of the specific area, according to that ratio the hovering UAVs decide the route which should be followed by them and so on UAVs delivery there forwarding services in the area where there is more traffic density. Every road is divided into segment and UAV collect hello messages and create set of connected nodes in its table and degree of connectivity is calculated according the distribution of nodes and information of connected segments. From given information UAV decide the path to be selected and degree of connectivity

   Path is selected on the base of the UAV tables and is needed at the intersection position because intersection is the place where there is need of decision to be taken and the position of the vehicles which are coming from opposite direction is required. As soon as the degree of connectivity is calculated by UAV by sending continuous hello messages and table is created following steps are kept under consideration:

- According to the collected tables information the vehicles have the vision of all segments around and they can get routing information as well as connected vehicles.
- In case when connectivity to the desired vehicle is not possible their high degree of connectivity node is selected that is neighboring to that desired vehicle.
- When closest to the destination node highest degree is detected and it is not in neighboring area in that case UAV is required and selection is based on the highest score and in sparse population UAV is used as forwarder.
- Greedy forwarding is used in the case when enough vehicles are available in the road segment providing connectivity.

II.LITERATURE SURVEY

Omar Sami Oubbati et al. (2016): It's not easy to build up an efficient routing solution in urban environment that provide reliable data delivery. Due to various obstacles like building the transmission is not clear and finding end to end shortest connected path between vehicles in urban city have to face many problems. UAV i.e. Unmanned Aerial Vehicles are used to overcome this problem as our motive is to evaluate the assistance of UAVs to vehicles in urban areas. In the given paper we develop technique for VANET (Vehicular Ad hoc Networks). The protocol we are using is based on two factors i.e. density of traffic and connectivity among vehicles on road. UAV checks the connectivity by sending hello message and though collect the information of traffic density. Now according to this information UAV is able to place itself to relay data in the case when connectivity on roadside vehicle to vehicle is not possible. Therefore, connectivity between vehicles is improved overall and we achieve improved routing process. A new routing method is developed based on density and connectivity of vehicles. Estimation of traffic density and correct calculation of reliable segments at intersections and avoiding the obstacles that decrease the no. of delivery packets on each road is done by the UAV. Future work in UVAR is to handle and examine the mobility of Unmanned Aerial Vehicles and propose a new technique based on location prediction.

J.HARRI et al. (2006): Vanet MobiSim is used to generate realistic movement traces of vehicles for telecommunication network simulators. Interaction between featured macro and micro mobility and ability to reproduce typical phenomena of vehicular traffic is illustrated by Vanet MobiSim mobility.Vanet MobiSim extension to CanuMobi Sim is competent of making mobility realistic traces of several network simulators. Detailed extension about macro and micro mobility is given and simulation results explained the distribution and density of vehicles. Introduced features in paper are essential for realism of VANET mobility.

S.M.MOUSAVI et al. (2007): Mobile Ad hoc Network is infrastructure less network which is made of a collection of nodes creating self-configuring network. MANETs are used in large scale. Various simulator parameters are used in which mobility model plays a vital role in checking the protocol performance in MANET. Therefore, analyzing of mobility models and their effect on MANET is essential. In this paper new framework for simulation of mobility in MANET is introduced which is generator of mobility traces in various mobility models. Customization of mobility traces is provided for different network simulators using XML and text formats. GUI and batch processing ability

is user friendly making simulator efficient and most efficiently useful in its field. In order to make its behavior more similar to real world mobile node motions new parameters are proposed to fix problems in last proposed methods. java based mobility simulator is developed which can be used to generate customized configuration. It is capable to trace mobility of network simulators which do not support mobility generation for MANET. User friendly GUI helps in analyzing of mobile nodes. Output traces can be represented in text formats and XML for the convenience of other network simulators. Future work is to make it more mobility model compatible and create real world behaviors. Work is done on making it more compatible with moving entities so as to use it in robotics and intelligent Transportation Systems. Mobility analyzer software is under construction which recognize patterns of mobility on learning based pattern recognition and can analyze mobility traces.

R.Kirtiga et al.(2014):VANET is wireless network which includes nodes that are in the form of vehicles which move on road ,information like road safety and traffic information are exchanged among these nodes. Conventional approaches in MANET are not as effective due to fast movement of vehicles in VANET. Demand is to develop a reliable routing strategy that minimizes link breakage and thereby increase throughput in VANET. Model is based on Gaussian distribution i.e. continuous probability function used to estimate link reliability between the vehicles. Graph is created in dynamic way and reliability is estimated hence most reliable data transmission is achieved. Variable velocity is taken in account by algorithm and computes link reliability along with route reliability value among vehicular nodes. In future link expiration time calculation on the basis of direction of vehicle will be calculated by using fuzzy logic by giving input as route reliability value and route expiration time and it will find most reliable path from source to destination. Sequence of nodes in reliable journey is added as an extension to AOMDV protocol header. Quality of service for VANET is proposed for performance evaluation.

Carlos Cambra Baseca et al.(2013): Intelligent video sensing system can be used by considering three main features which are high definition video transfer which provide high quality of image transmission, wireless ad-hoc network that can locate and focus on sensible issue, sufficient bandwidth to provide high definition quality. In this paper we provide communication protocol designed and deployed for high definition video transfers between devices running on various OS like Android and Linux OS. Using AR Drones and forming ad-hoc network using Wi-Fi that demonstrate big potential we calculate experimental results.AR drones have many controllable sensors which control automatically using GPS or manually by remote therefore it has brought a revolution. Using image processing done intelligent video sensing by using AR Drones. Proposed for intense agricultural production in cereals and error monitoring in irrigation systems. Dry periods are prevented by this visualization in case when sprinkles are blocked by leaf, sand and dirt inside pipes. Demonstration is provided on the base of analysis of Ground Control and OLSR routing ad hoc protocol usage can be done with mobile communications nodes exchanging information while moving in space and using GPS. In test bed three nodes which are working in 200 m in length are working and area checked is approx. 1.5-2 ha/min during 30 min flight. Faster visualization for agricultural monitoring and also used to detect risk like fire or dry situations along with critical area control.AR Drones provide intelligent video sensing and provide HD images and high image processing with algorithms. Future Work: video processing algorithm and GPS automation

Michael Le et al. (2005): Incorporating Ad hoc On Demand (AODV) with Disruption Tolerant Networking (DTN) along with store-carry-forward mechanisms with interface of UAV as carriers we put forward a new routing strategy to provide network connectivity in highly partitioned ad-hoc networks. Design, implementation and implementation of strategy is done in this paper. DTN is implemented on top of unmodified AODV and advantages of DTN protocol is shown through ns-2. Routing strategy for highly partitioned mobile ad hoc networks which uses AODV as underlying routing protocol and minor augmentation for DTN support. Use GPS information and trajectory calculation of UAVs for route discovery and data forwarding although it will require more elaborate geo information exchange for mobility and latency. Various policies can be simulated in future

Charles E. Perkins et al.(2000): Ad-hoc network an infrastructure less and without any intervention among collection of nodes which are mobile nodes have no centralize access point.in the paper AODV i.e. Ad-hoc on Demand Distance Vector Routing in which routes are obtained by mobile host as they operates as special router. Users wishing to use ad-hoc network according to their need therefore dynamic self-starting network is best choice. Loop-free routes are provided by AODV and overall bandwidth is and demand is less although we have maintained most of advantages in distance vector routing mechanisms. Algorithm scales to large population of mobile nodes and evaluation methodology and simulation results that are to be verified of the operation of algorithm. Distance vector Routing algorithm is proposed for ad hoc networks AODV removes previous problems and has various features which include that needed routes are stored by nodes, minimum broadcast needles memory requirement, quick response to link breakage, using destination sequence no. loop free routes are maintained and it is scalable to large population. Compare to DSDV our algorithm has more latency therefore we have to take some steps which are aging out of inactive routes, reporting of breakages in route and retuning of destination by intermediate node. Improvements are enabled by bookkeeping and associating route with active neighbor list.

MoezJerbi et al.(2009): Multihop data delivery among vehicles in VANET and is an important aspect as well as support. Data spreading along with routing is addressed and newer research challenges are offered and diversity in application. This paper is based on the improved Greedy traffic aware routing protocol(GyTAR) i.e. robust routing technique in urban environment. GyTAR is the dynamic and in-sequence selection of intersection through which data packet are forwarded. Intersection is choose considering parameters like remaining distance to destination and traffic variations. GyTAR is using greedy carry and forward technique and which leads to performance improvement in comparison to another and extensive simulation along with optimally and sensitivity of significant GyTAR parameters. GyTAR protocol uniquely utilizes high dynamically vehicular traffic, road side traffic density, road topology and route forwarding decisions. Dynamic and sequential selection is made along selection of intermediate intersections on the base of score. Curve metric and traffic density information are included for score determination. There is possibility of very few errors in this method keeping a balance optimum value of weighting factor of traffic and density are and distance are evaluated. Performance of GyTAR is better than other protocols in throughput and routing overhead. Higher throughput and lower delay, less routing overhead. Improved greedy carry and forward and robust intersections provide stable communication while maintain higher throughput and lower delays for routing.

Kayhan Zrar Ghafoor et al.(2013): Vehicular Ad hoc Network(VANET)provide ubiquitous connectivity among vehicles with infrastructure. In high mobility vehicular networks there are two important research challenges i.e. beaconing approach and Multi-hop. Two types of routing protocols are there position based and topology based. In this paper we do comparative study among existing routing protocols to find drawbacks and advantages. analyze the simulation result after implementing geographical and topology routing protocols and discuss pros and cons. In end discussion of VANET routing protocols and their issues are considered. Have done performance comparison on the base of simulation following metrics such as packet delay, average path length, through-put and routing overhead. Poor performance is shown in topology based routing, proactive solutions due to local cache maintenance. Beaconless (CBF) and delay-

tolerant(SRR) routing protocols has better performance in term delivery ratio and average packet delay in respect to GPCR and AODV. Benchmarking routing solutions for evaluation purpose.

III.CONCLUSION

From study of various research works in the field of VANET, it is clear that large amount of researches are being done in this field. Still there is a scope for enhancing the research work. Because current techniques are not proving 100% solutions. We can enhance the existing techniques for path identification and making the moving wireless connected vehicle to the other vehicle and Road Side Units. It helps in making two or more vehicles to know the traffic state further on the road or if there is traffic jam, there is a sharp turn. This type of communication will help in making driver to be aware of the road status and it reduces the probability of accidents.

IV.FUTURE WORK

Currently for path identification Dijkastra based technique is used for identification of the shortest route between vehicles. This work is done not for optimal path but to considers the shortest path. Now further by using Genetic based technique more optimized result can be generated.

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