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Survey on Collision Avoidance in VANET

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ABSTRACT

VANET is an emerging technology to achieve intelligent inter-vehicle transmission and result if VANET. It Mostly resembles criteria remain same. The speed and choice of the path describe the dynamic topology [2] of VANET. If we assume two vehicles moving away from each other with a speed of 60 mph. Some of the well known ad hoc routing protocol such as AODV (Ad Hoc on demand distance vector) and DSR (Dynamic source routing) are therefore can be applied to VANET as well. VANET provides a wide range of applications like safety of vehicles on roads, driver assistance, sharing traffic and determining road conditions for smooth flow of traffic. In this paper various systems using collision avoidance [8] and provides the road safety using ITS (Intersection collision avoidance), CWAS (collision warning avoidance system), and the most appropriate simulation tools to simulate VANET protocol and applications). VANET has the tremendous challenges in roadside areas because VANET having the potential to avoid the traffic accidents and having efficiency. Recent research have been placed the VANET design architectures and implementations. Nowadays VANET research work have been focuses on the including areas like routing, broadcasting, Quality of Service (QoS), and security. We survey some of the research results in these areas.

Keywords:— *VANET, collision avoidance, collision waning system, vehicle to vehicle communications.*

I. INTRODUCTION

Nowadays we get an increase in several of vehicles, making vast traffic and additional chances of any sort of accidents. To avoid the possibilities of accidents VANET is a special tool that required to be used. VANET provides a wireless [19] communication between moving vehicles, employing a dedicated short varies communication (DSRC).

In VANET, vehicles will communicate one another (V2V, Vehicle-to-Vehicle communications [18]) they will catch up with associate degree infrastructure (V2I, Vehicle-to -Infrastructure) to induce some service. Vehicle will communicate with alternative vehicles directly forming vehicle to vehicle communication (V2V) or communicate with mounted instrumentation next to the road named as road facet unit (RSU) forming vehicle to infrastructure.

VANETS application's types are classified into safety and efficiency [2]. There are many difficulties in VANETS systems design and implementation, including: security, privacy, collision avoidance, routing and connectivity. In this paper we focus on the collision avoidance problem in the vehicle to vehicle communication (V2V). It Discusses some

proposed avoidance solutions, collision avoidance, protocols, classifications, and illustrates some challenges and open issues in VANET collision.

The main goal for collision [11] turning away is to supply optimum ways between network [12] nodes via minimum overhead. Abundant collisions turning away are developed for VANETS setting, which may be classified in some ways, in step with totally different aspects such as: It protocols characteristics, techniques used, routing data, quality of services, network structures, collision algorithms, and so on. VANET are very large scale network [15]. More vehicles are transmitting on roads with the network.

2. ARCHITECTURE OF VEHICULAR NETWORK

The VANETS architecture is three main categories:

Inter-vehicle communication: this is often conjointly referred to as vehicle-to-vehicle (V2V) communication or networking. Any valuable information collected from sensors on a vehicle may be sent to neighboring vehicles.

Vehicle-to-road communication: this is often conjointly referred to as vehicle-to-infrastructure (V2I) communication. During this period, the vehicles will use cellular gate ways that and wireless native space network. Access points to attach to the web and facilitate transport applications.

Inter-road communication: this is often conjointly referred to as hybrid vehicles-to-roadside communication. Vehicles will use infrastructure to speak with alternative one another and share the data [17] received from infrastructure with other vehicles during a peer -to-peer mode through impromptu communication.

Vehicle communication between the roadside and infrastructure it helps to connect by the RSU units and provides the system provider through the sensors. The architecture of the vehicular ad-hoc network helps to find out the system providing in the useful ways. Communication between the system and road side system providing the system specifications in the units

Architecture of the VANET helps tend to provide the usefulness of the vehicle communication between the system and sector. the RSU and base station providing some of the regions of the system hoc network helps to find out the system providing in the useful ways. Communication between the system and road side system providing the system specifications in the units.

Architecture of the VANET helps tend to provide the usefulness of the vehicle communication between the system and sector. the RSU and base station providing some of the regions of the system control by the defined architecture system. Vehicular ad-hoc network provides the system providing single base station.

The base station and RSU Units helps to trend to provide the single selection of the system and easily connected to the system and avoid accidents in roadside infrastructure.

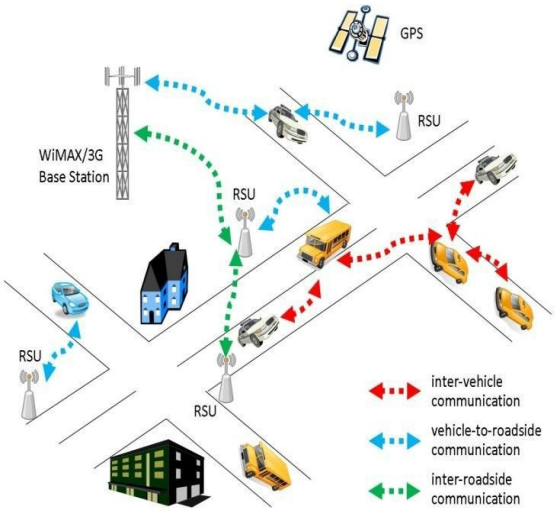

Figure 1. VANET Architecture

III. Related Works

Yi Zhu. Taozhang, uses Mobile robots to avoid collision with moving obstacles for the safe sector for that vector field histogram (VFH) method will be used. To avoid the collisions, here obstacles are using for secure for safety, [5]and new speed control factor designed, and it accounts when guiding the robot[20]. Speed controls law-the time dependent, and they used to provide network control specification speed control law will take more factors than VFH (vector field histogram). Obstacles used to select the directions and speed of the robots.

Irfan Ullah, [3]Multiple sensor's robots have to explore the environment more effectively, for that in a mobile robot surroundings of tracking and collision warning avoidance system (CWAS) is obtained, and its implemented in the wheeled mobile robot multiple of sensors on the mobile robot increase the safety level. Binary logic controller hardware designed circuit range sensor be used. Robot monitor helps to change the motion [1] of the vehicle. Mobile robots indicate the warning alarm by activate the motion mode, to avoid collision Cunjialiu. Wen Hua Chen,[2] For safety and clearance process obstacle avoidance systems [10] performed using optimization by (UAV) unmanned aerial vehicles, in air space, 3D. It generates a feasible path in real time. Ray tracing [16] and limit cycle navigation is combined. Sequential quadratic programming-solving smooth and well scaled nonlinear optimization [9] problems. In the absence of a pilot in air space with the use of UAV will increase the military and civilian applications. In the presence of obstacles, the aircraft will fly. Without the pilot computer, algorithm generate a feasible path in real time.

Yi – Jen Mon. Chith –Min Lin,[5]Supervisory recurrent fuzzy neural network (SRFNN) Deal with vehicle collisions avoidance system (VCAS) For safety ranges to avoid traffic accidences. SRFNN control system is composed of a recurrent fuzzy neural network (RFNN). Formula based method-safe distance is used to SFRNN. Sliding mode control is to drive the trajectory with sliding window. For practical safety, distance will compare to real distance between own vehicle and front vehicle to avoid an accident with the help of signals, sounds.

Jiaojie Li,[6] The Coordinated obstacle avoidance algorithms of multi agents systems subset of agents, the agents by passing and assembling the opposite side of an obstacle defined the initial relative position of agents and both agent's first kinematics and dynamics. Interaction topology [10] multi agent encounters a unique obstacle. Circular motion will navigate the control motion matrix. Not every obstacle is necessary for sensing information. Fuzzy logic was applied and repulsive potential function.

Michalehoy, Alexey S. Matveev,[8] For the problem of navigating vehicles through an unknown static Environment, auxiliary controller is used. Producing in a single robot in cluttered environment using (MPC). Trajectory planning module (TPM) from the planned start for current state [13] vehicle. Path tracking module (PTM) deviations in space and time. Positive side able to ensure the avoidance of deadlock situations. Ad-hoc environment's decentralized control laws.

IV. Challenges in VANET

VANET supports numerous vary of on road applications and therefore, need economic and effective radio resource management methods. [4]This includes QOS management, capability, connection, packet loss reduction, packet programming and fairness assurance.

Frequent Link Disconnections: vehicle's area unit extremely and customarily travels at higher speeds, particularly on highways (i.e., over one hundred km/hr) and so changes the topology of a network that causes intermittent

communication links between a supply and a destination.

Node Distribution: vehicles aren't uniformly distributed within the given region [5]. Hot spots like industrial district and looking canters will attract additional individuals, which ends up in higher node distribution.

4.1 Collision Avoidance in VANET

The collision zone is known, and also the possible collision is occurred. On account of the vehicle with reference to one another, the collision zone space becomes larger. The primary technique is to avoid is that the accommodative control technique, wherever the braking system is controlled by the machine mechanically and also the vehicles maintain the gap here they justify the varied technique as follows:

4.1.1 VFH (Vector Field Histogram) Method

The new method adopts safe sectors in the vector field histogram (VFH) method, which is a motion planning method, mainly for static environments. VFH is better to handle moving obstacles than the VFH method. Another improvement method is speed control law. VFH method has another improvement safe sector of the method.

4.1.2 Collision Avoidance System Warning

Designed tracking and the collision warning avoidance system we are using the multiple sensors in a mobile robot. The security will be increased on all sides of the direction in sensor. The robot will be used in two modes manual mode and CWAS mode.

4.1.3 Collision Avoidance System in the Vehicle (VCAS)

A vehicle collision avoidance system (VCAS) which determines the possibility of collision according to the distance between the travelling vehicle (or called own vehicle) and the front vehicle. The effects of the system will be increased.

4.1.4 Path Tracking Module (PTM)

Path tracking module having the planned and actual position in lane. The goal of collision avoidance requires a time latency of communication.

4.1.5 Cooperative Collision Avoidance

Cooperative control along with obstacle avoidance in multi-agents has been used in the system. The cooperative control algorithms to guide the agents tracking the vehicle which avoid the obstacle.

4.1.6 Collision Avoidance Assistance

Obstacle collision avoidance system in which the system performs a brake-assisting upon detection of the driver applying the brakes. The problem with such a system is same to peoples.

4.1.7 Distributed Reactive Collision Avoidance (DRCA)

The DRCA having the two-step process in optimization which maintenance the force field and collision scale. Conceptually, this method turns to a signal, and the new vehicle tells the group how it will be accelerating, and then work around that decision. As such, each vehicle will see no conflicts with a machine.

4.1.8 Alert for Collision Avoidance System

When the goal is to avoid any collision with the help of collision avoidance system, the system must be predictive. It has two basic concepts: the system sensitivity level and the warning time available. The first level use to reduce the system sensitivity through the warning alarms and second one use to predict the modulation timing in collision avoidance

system. The collision avoidance system use to reduce the accidents in the alert functions.

V. HALLENGES IN COLLISION AVOIDANCE

5.1.1 MAC Design

VANET usually uses the shared medium to communicate. The MAC design is the key issue. TDMA, SDMA, and CSMA based Mac for VANET.

5.1.2 Security

The road safety applications are used in VANET, which helps to avoid traffic, accidents in roads.

5.1.3 Automotive Control System

Nowadays accidents are occurring in roadsides areas and cause injuries so to prevent that traffic solution automotive control system will help to prevent the accidents.

5.1.4 Wireless sensor networks

WSN will help to protect the roadside traffic accidents with the help of sensitivity sensors in the on board units and safer side functions in the sensor networks. To build an effective and proceeding functions in sensor networks are reduce accidents in road side areas.

5.1.5 Automated driving functions

The automated driving functions helps the people will avoid accidents in lane for an example parking an vehicle in lane, animals etc..Which make synchronized functions elaborate the traffic functions through the automated driving functions.

5.1.6 Portable collision system

The portable collision system which transfers the information through the road side units will help the peoples to avoid accidents in the lane. This information not only reduce the sensor networks it will helps the vehicles to transfer information fast.

VI. COLLISION AVOIDANCE FUTURE WORK

Increase the threshold for moving obstacles collision can be avoided by an increase the distance from an obstacle. In the collision avoidance system, so here, increase the distance of 50cm for the object to avoid the collision. Through sensor data, path planning collision avoidance optimization will clear. Sensor data and visual system,[8] Model complexity used in different levels. Speed simulation will help to make a safe distance in robots. Fuzzy interface system makes the neural computing system [6] approaches to be filled in the system. Coordinated motion, Light approaching behavior and for free motion [21] execution localization process provides continuous position estimation.

In collision avoidance existing path movements in roads to adapt the source and destination of the vehicles. Source and reaching point of the road will created the remaining source to route. Similarly the node will transmit the intersections points to the RSU and OBU. The traffic maintenance will update the source node to avoid the collision in roadways. The destination sometimes will receive the duplicate nodes so the sending data packet will store in the header packets.

A source and destination path of the node will always require the relay approaches [23] the sensor networks and data packet transmission [3].the each receiving path adopt the secure and computes the system functions. The nodes and their time will calculate the computation in sender node to the system. The secure nodes and some of the functions are rarely deliver the ratio of the source and destination.

The source node wants to communicate with the destination node and establish the secure path and prevent the incurred transmission path of the VANET and request the packets to send

the MAC layer and provides clear successfully delivered. The intersections path probability sends the transmission [23] path and provides to perform better network space in roadways increase the number of nodes and translate the link nodes in routing path [6]. The main advantage of the route to avoid the traffic in collision avoidance a maximum number of nodes will forward to the root node of the system. Some of the packets will constantly increase the message path.

Vehicular network will send the data to send the transmission system and will require the communication between the systems. The vehicle will move to the required path of the system. The main applications of the system node transfer the main functional system and extend the system specifications. The environments functions on the VANET network space in the collision. The system will maintain the traffic and analyze.

VII. Special Characteristics of VANET

The feature of VANET similar the operation technology of MANET in the sense that the method of self-organization, low bandwidth and shared radio transmission criteria stay same. But the key hindrance [7] in operation of VANET comes from the high speed and uncertain mobility of the mobile nodes (vehicles) along the paths. Moreover, VANETs have unique features over MANETs as follows: Higher transmission power and storage: The network nodes (vehicles) in VANETs are usually equipped with higher power and storage than those in MANETs. Higher computational capability: Operating vehicles can afford, communication and sensing capabilities than MANETs. Predictable Mobility: Unlike MANETs, the network nodes moved over on a VANET can be predicted because they move on a road network. Ad-hoc on demand distance vector protocol [22] is also known as reactive protocol [14] which sending the data packets by nodes required. In AODV protocol, the route will be built for node needs to send the packet and could not updated until the route breaks or times out. It is necessary for a node to communicate with another node only when the reactive path opens a route. Routes currently in use reducing the burden on the network. It maintains only routes, query packets are flooded into the network in route discovery phase. The phase completes once a route is found. Overlay is a network every node is connected by virtual or logical links which is built on top of an existing network. The Vehicular ad-hoc network will be developed from the combination of position based routing protocol and topological routing protocol. This protocol provides the clear traffic method and selects the best route for sending the source node to destination node.

VIII. Conclusion

Thus in this paper, we provide an idea of what is VANET its architecture and its applications with collision avoidance. Collision is often traffic bottlenecks contributing to significant trip delays. In this paper, our goal was to design collision management protocols using only vehicle-to-vehicle communications to address these two core issues of safety and throughput. The collisions can be reduced, and throughput improved significantly using only V2V. Through this study of different VANET collision, many related open issues and research challenges are found and represented. These issues are still more effort and research to define them.

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