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Review of Intelligent Transportation System and Performance Improvement of Routing Protocols for Vehicular Ad-Hoc Networks (VANETs)

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Abstract: ***Vehicular Ad Hoc Network is a kind of extraordinary wireless ad-hoc network, which has the personality of high node agility and fast topology modifications. VANET has become an active area of research and development because it has remarkable potential to develop vehicle and road safety, traffic efficiency and ease as well as comfort to both drivers and passengers. Road Traffic Information System (RTIS) is a key component of the modern intelligent transportation system (ITS) the VANET structural designs provide an excellent support to develop a highly developed road traffic signaling system. Vehicular networks will only provide safety and lifesaving applications and they will also develop a powerful communication tool for their users. This paper presenting on ISPC-2016 is based on review of the general outlines of VANETs, critical security issues, performance metrics of routing protocols(end-end delay, packet delivery ratio and throughput), intelligent transportation system (ITS), Application for automatic accident detection combined with multimode alert diffusion***
Keywords: Ad-Hoc Network, RTIS, Protocols, Topology, Traffic Efficiency, ITS, Security

I. INTRODUCTION

The Vehicular Ad-Hoc Network is a expertise that utilizes to moves cars as nodes (client) in a network to engender a mobile network. VANet turns every participating car into a wireless router or node, sanctioning cars approximately 100 to 400 meters of each other to connect and, in turn, engender a network with a wide range. As cars fall out of the signal range and drop out of the network, other cars can join in, connecting conveyances to one another so that a mobile Internet is engendered. The first systems that will integrate this technology are denoted to communicate with each other for safety purposes. A conveyance can communicate with another conveyance directly which is called Vehicle to Vehicle (V2V) communication, or a conveyance can communicate to an infrastructure such as a Road Side Unit (RSU), kenned as Conveyance-to-Infrastructure (V2I). [1] This paper discusses about intelligent transport systems and its implementation, routing protocols with performance (end-end delay, and packet delivery ratio throughput) for VANET and presents application for automatic accident detection using algorithms. Security issues in VANET environment are also addressed in the paper so that trustworthy network architecture can be modelled. [8]

II. INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent transport systems (ITS) combine advanced info technology, telecommunication technology, sensor technology, management strategies, control technology associated laptop technology to an integral transportation management system, which is an integrated manner to give somebody info to extend the protection and potency of the surface transportation systems. These methods include vehicles, drivers, passengers, road operators, and managers all interacting with each different and also the atmosphere, and linking with the complex infrastructure systems to improve the protection and capability of road systems. Intelligent VANET aims at providing modern inventive services relating to completely different modes of transport and traffic management, to enable numerous users to be best sophisticated and to build use of transport networks a lot of safely and a lot of expeditiously. Intelligent Transportation Systems (ITS) is the application of computer, electronics, associated communication technologies and management strategies as reported by Commission for world Road Safety (June 2009), the global road deaths were between 800,000 to 900,000 in the year 2002 and estimated concerning 1.30 million deaths per year and also the toll is increasing additional. World health organization report (2002) showed that in the year 1990 road accidents as an explanation for death or incapacity were the ninth most important explanation for death or disability and expected that by 2025 this can move to the sixth place. Without important changes to the road transport systems, these dreadful figures are seemingly to increase considerably. Traditional driver coaching, infrastructure and safety improvements, may contribute to abound extent to scale back the quantity of accidents however not enough to struggle this hazard. Intelligent Transport Systems are the best answer to the matter. [1]

A. Implementation of ITS Systems

Intelligent transport system develops the transportation safety and mobility to enhances world property by suggests that of productivity enhancements achieved through the addition of progressive communications technologies into the transportation infrastructure and in automobiles. ITS is the integrated application of advanced technologies using electronics, computers, communications, and advanced sensors. These applications provide travellers with important information while improving the safety and efficiency of the transportation system. [1]

To organize ITS, a structure is developed to reflect various services the ITS can propose to the users. Few listed service has been provided by National ITS Program set up (NIPP). These services are based on the approach of the association and allocation of familiar technical functions. [2]

III. ROUTING PROTOCOLS

Routing Protocol is used in network to send data from host to objective. They are classified into 3 categories Proactive, Reactive and Hybrid protocol. Here we can transient concerning proactive and reactive. Proactive protocol continuously tries to maintain updated routing data on each node within the network. Reactive protocols or on-demand routing protocols rather than hoping on periodical broadcasts of obtainable routes, discover routes when required, build and maintain paths. Hybrid Routing Protocol (HRP) is a network routing protocol that mixes Reactive Routing Protocol and Proactive Protocol features. VANET routing protocols are loosely divided into 2 classes table driven protocols and supply initiated on demand protocol. [1]

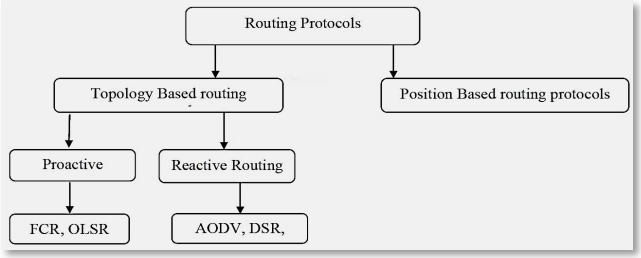

Figure 1: Illustrates the taxonomy of these routing in VANET

A. Topology-Based Protocols

These routing protocols use the link information that exists in the network to send the information packets from supply to destination. They can even be classified as proactive (table-driven) and reactive (on-demand) routing.[12][14]

1) *Proactive (Table-Driven):* Protocol chooses the route path which usually depends on shortest path algorithms. They keep information of all connected nodes in form of tables because these protocols are table based. Furthermore, these tables are also shared with their neighbors. [15]

a) *Optimized Link State Routing Protocol (OLSR).*

b) *Fisheye State Routing (FSR).*

2) *Reactive (On Demand):* Reactive routing protocol is called on demand routing because it starts route discovery when a node needs to communicate with another node thus it reduces network traffic The usual methodology of route operation is to flood the network with a question, in order to seek out the target station.[15]

a) *Dynamic Source Routing (DSR)*

b) *Ad-Hoc on-Demand Distance Vector (AODV).*

B. Position Based Protocols

It uses mob cast messages to communicate with the vehicles. Its main factor of consideration is time and the main goal is that the communication between vehicles within prescribed region at a particular time which is known as zone of relevance (ZOR).Its various examples are like IVG, DG-CASTOR, destination-Sequenced Distance-Vector Routing (DSDV).[15]

C. Performance Metrics

The execution measurements aides on deciding the conduct and execution for directing conventions will attain that calibre about administration quality of service (QOS). Execution measurements measures the exercises What's more execution of directing conventions. [4][5]

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D. End-to-End Delay

It is those time taken toward those information bundle on transmit over those system starting with wellspring with end. End-to-end delay relies for Emulating components:

1) Transmission delay (TD).
2) Propagation Time (PT).
3) Preparing delay (PD).
4) Queuing delay (QD).

Equation from claiming end-to-end delay is:

End-to-end delay = TD + PT + PD + QD.[10]

E. Throughput

Throughput will be those effectively information conveyance through a correspondence system. It is those whole of the information rates that would conveyed with every last one of terminals on an organizer. Equation for throughput is:[10]

*Throughput = accepted data*8/data transmission time.*

F. Packet Delivery Ratio (PDR)

Those proportion from claiming packets that region unit for victory conveyed with An end contrasted with the go about packets that need aid sent out Eventually Tom's perusing the supply. Equation should figure bundle conveyance proportion is:[10]

*Packet Delivery Ratio = accepted packets/generated packets * a hundred.[10]*

Movement assessed the exhibitions from claiming DSR, AODV, Also FSR for the Grid model mobility, inasmuch as FSR, DSR and AODV hint at guaranteeing brings about city particular circumstances. Those parameters to diverse examination utilized from the individuals used clinched alongside our consider. Directing protocol AODV, DSDV Furthermore DSR execution investigates done roadway circumstances on the premise of auto speed and also those thicknesses about movement. [11]

DSDV may be requiring each hub should infrequently show routeing updates. In the network, each hub supports routeing information over an exceedingly routeing table. Each routeing table passage holds an end node, the end of the next hop, a metric and the arrangement amount. Those grouping number may be those cohort key characteristic from claiming DSDV abuse that it abstains from routeing loops by eliminating stale sections. In the network, the incessant transforms got to a chance to be updated inside the routeing tables of the hubs. Analysis outcomes execution for directing Protocol in VANET.[6]

No. Of Nodes	Routing Protocol	Throughput	End-to-end Delay	Packet Deliver Ratio
75	AODV	410	300	97
	DSR	350	310	97.5
	DSDV	310	810	99
	AVERAGE	356.7	473	97.5

Figure 2:Analysis Result performances for Routing Protocol in VANET.[6]

As stated by analysis, delay and jitter over VANET might make sufficient to the majority of the imagined unicast-based applications, same time proportion of the bundle conveyance and association span might not help those necessities to practically unicast-based provisions. To re-enactment investigation of DSR, AODV what's more FSR for the portability model closed that FSR, DSR Furthermore AODV indicate guaranteeing brings about city situations. [10]

IV. APPLICATION FOR AUTOMATIC ACCIDENT DETECTION COMBINED WITH MULTIMODEL ALERT DIFFUSION

A. *Introduction*

In the survey conducted, few papers on accident detection have been studied and analysed to grasp the previous developments and proposal within the field of accident detection. On the basis of the survey, we will depict the benefits and downsides for automatic accident detection. The study is depicted in a tabular format with appropriate parameters describing the quality of the algorithms.

1) Automatic accident detection focuses on increasing the safety, automatic accident detection, emergency maintenance android threat warning diffusion.

2) Net of things for smart cities addresses associate degree urban Internet of Things (IoT) system that is specific to associate degree application domain. Urban IoT, supports the Smart town vision, providing most advanced communication technologies and services to the citizens.

3) The impact of rapid Incident Detection on state highway accidents fatalities focuses on reducing the time between the occurrences of accidents associate degree estimates the impact of state highway incident detection systems on with providing fatality reduction edges in an economic manner.

4) Using smart phones to identify automobile accidents and offer conditional cognizance to Emergency response provides solutions to the key issues in police work traffic accidents to avoid false positives and will increase preparation to emergency responders.

5) Efficient Accident Detection and Rescue System using ABEONA algorithmic program forecasts traffic congestion events and directs the driving force to alter the route consequently.

6) Providing Accident Detection in vehicular networks through On Board diagnostic (OBD)-II devices and golem primarily based smart phones combines the existing vehicles with smart phones to facilitate Intelligent Transportation Systems (ITS). It proposes associate degree golem application that uses an OBD-II interface to observe accidents exploitation the attractive force intimate by the passengers in collisions together with bag triggers.

B. *Literature Survey*

This section gives a comparative study of the formerly developed procedures for accident detection. The survey highlights their positive and negative points.

1) Accident Detection Algorithm proposed a Mobile Application for automatic accident detection and multimodal alert which uses an Accident Detection Procedure. It uses eCall system to automatically detect Vehicle accidents along with Collisions and roll-overs. The Acceleration strictness Index (ASI) evaluates the potential risks for occupants.

2) A Communication Flow Algorithm has been proposed in which Backend Systems interact with IoT using Database Management Systems and Web sites. Gateways inter-connect the end devices to the main communication infrastructure of the system. IoT peripheral nodes produce the data that is to be delivered to the control centre.

3) Incident Detection Algorithm proposed an Incident Detection Algorithm to identify incidents, verify the nature of incidents and provide emergency services based on the nature.

4) A Wreck Watch Approach has been introduced in which the device accelerometer detects wreck utilizing device sensors to detect traffic accidents and notify first responders. Users utilize map to view wreck information and other motorists can view accident locations immediately and avoid accident locations. Also, users can upload or view images of the wreck to the server to provide first responders with additional information related to the accident.

5) Algorithm is proposed in which an accident is detected using crash sensors of the air bag sensors. A GPS is used to locate an accident spot and Vehicular Ad-Hoc Networks (VANET) is used to broadcast messages. It enables rescue services to forecast traffic congestion events and re-route their path accordingly to reach the location as soon as possible. Traffic signal module in this system, receives the information about the accident and the VANET signal receiver is switched ON to search for ambulance closest to the traffic signal.

The advantages and disadvantages of the above algorithms are described in Table 1. [6]

Parameters	Advantages	Disadvantages
(A) Accident Detection Algorithm	1. Automatic Accident Detection using HDy Co-pilot 2. Interruptible Countdown Sequence.	Use of GSM radios was restricted due to lack of API.
(B) Communication Flow	1. Exploits the most advanced communication technologies. 2. IoT can assist people with everyday plans.	Constant internet connectivity is required.
(C) Incident Detection Algorithm	1. Rapid incident detection. 2. Reducing crash related injuries and deaths.	Restricted to urban highway accidents.
(D) Wreck Watch Approach	1. Automatic Crash Notification (ACN) system saves lives by reducing the time required for emergency responders to arrive. 2. ACN systems use a network of sensors in a vehicle to detect car accidents and communicate with a monitoring station via a cellular radio.	1. Conventional ACN systems are expensive. 2. Lack of portability limits its usefulness to the owners and constrains increase in safety of the vehicle. 3. Preventing false positives is hard.
(E) ABEONA Algorithm	1. Informs the emergency services and enables them to reach the accident spot early. 2. VANET automatically communicates the accident case to the surrounding vehicles. 3. ABEONA Algorithm analyses several factors and finds out the most efficient path to reach accident spot.	Requires a VANET thereby increasing the cost.
(F) Accident Detection through OBD-II devices and Android phones	Achieves a detailed characterization and management service.	

Table 1: Comparison of Accident Detection Algorithms Algorithm

Introduced an application for accident detection in transmission networks through OBD-II (On-Board Diagnostics) devices and mechanical man based mostly Smartphone's. The application checks whether Bluetooth is enabled returning a slip-up otherwise. It attempts to contact the ODB-II device outlined. In case it's found the various protocols supported are checked to work out that one is valid for this vehicle. If bidirectional communication is established with success, the application will begin the system watching method. If either the airbag is triggered, or the deceleration detected is bigger than 5 G's, we contemplate that Associate in a Nursing accident has occurred. If the data channel is accessible, then it retrieves GPS Associate in Nursing accident details followed by sending crucial knowledge and creating an emergency decision directly. The application stops receiving the info, but will not stop its execution and continues to perform. The time elapsed between the incidence of a change and the beginning with the enumeration activity is 700 milliseconds, which express that the application responds rapidly. If the count-down is not stopped then Associate in Nursing SMS is distributed to the contacts when ten seconds and a voice decision is placed when more or less five seconds when the delivery of the SMS. This waiting time is necessary to confirm unobstructed GSM property failing that the decision would fail (A). Thus, this algorithm provides the best resolution to accident detection and provides higher accuracy and satisfies most of the wants of the planned system. After a thorough study of (A)-(F) we tend to propose the concept of mixing the accident detection and alert system with urban IoT for sensible Cities. We additionally look forward to synchronize all the emergency services like creating the machine offered directly, necessary medication to be given to the patient united with online automatic completion of hospital formalities like filling forms, using Smartphone and also the thought of IoT, therefore, reducing the hardware price of the system and the time consumed in these activities. [6]

V. CONCLUSION

ITS applications presently facing the authenticity, and being industrialized, have marvellous potential to reduce the incidence and rigorousness of road crashes. To do so, though, human factors ethics and knowledge should be incorporated into the style of those systems and that they ought to provide for the special desires of varied road user teams. Failure to do so may seriously compromise the protection of the complete road transport system. In this paper on reviewing, the exposed issue in VANET routing is then whether there is any standard tool for estimating these protocols.The research direction is that as VANET routings are advancing and changing into enhanced, many of the underlying assumptions and technologies would like to become bigger, therefore, in order that a lot of validity will be given to the advantages of those routing protocols. An Automatic accident detection and alert mechanism called wreck watch with smart phone. This paper presents how system can automatically detect traffic accident. Wreck watch has number of limitation such as audible data is not sufficient for detecting traffic accident, ignore on-board sensor for detecting etc.

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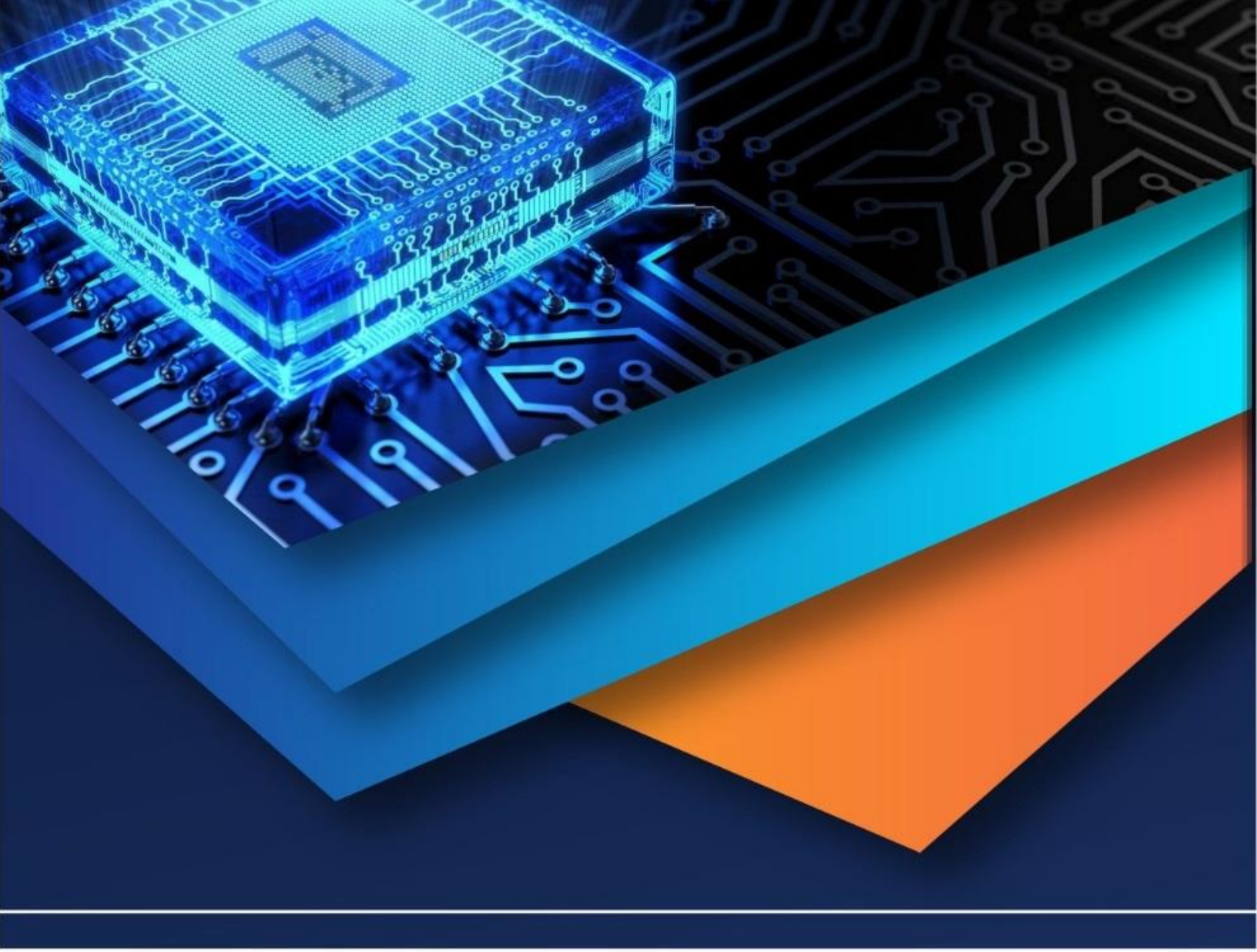

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