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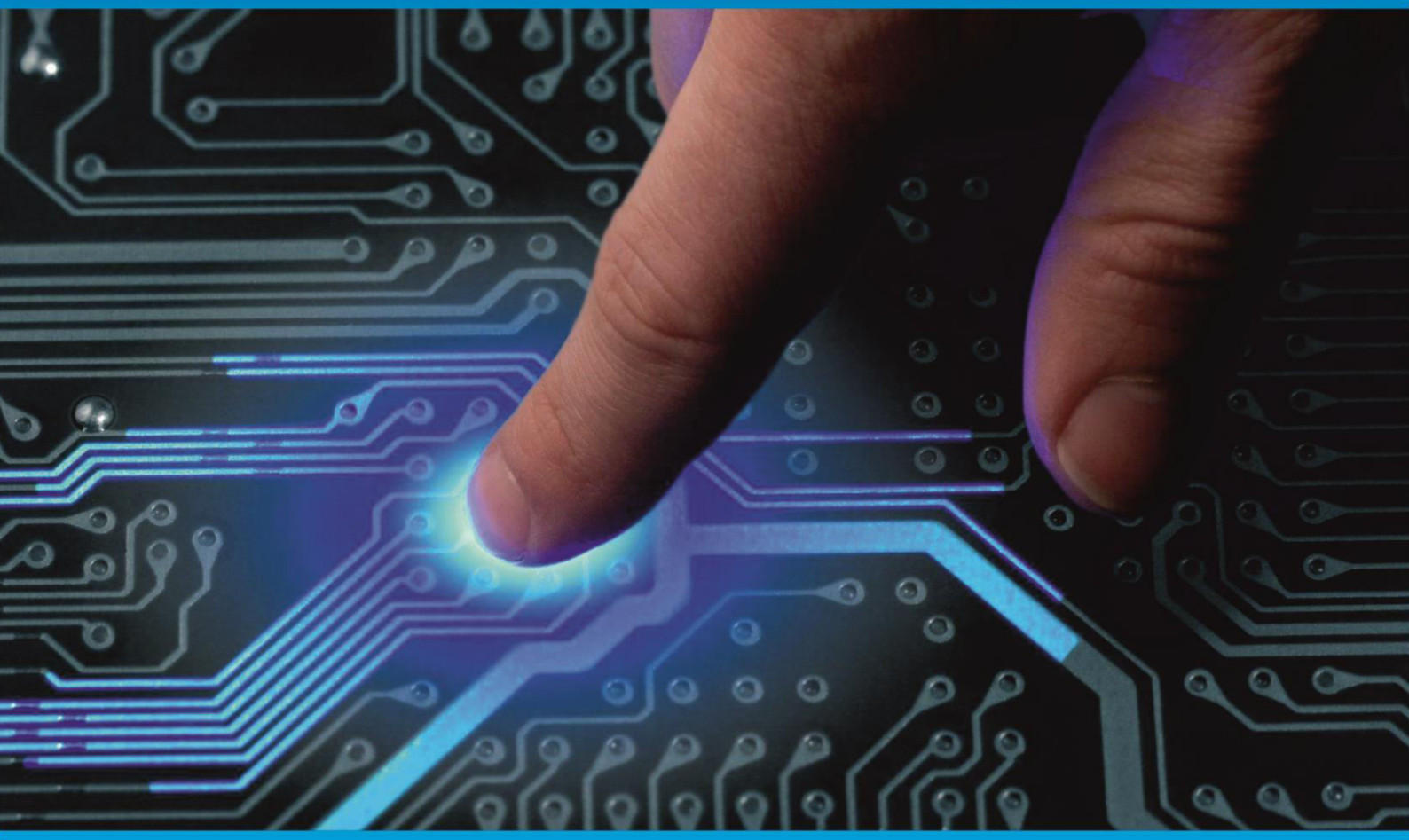

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V2I and V2X Monitoring System Using VANET

V. Muthu Kumaran[1], M. Mounika[2], M. Preethiga[3], V. Pradeep[4], K. Suganya Devi[5]

UG Student, Dept of E.C.E., Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India[1]

UG Student, Dept of E.C.E., Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India[2]

UG Student, Dept of E.C.E., Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India[3]

UG Student, Dept of E.C.E., Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India[4]

Assistant Professor, Dept of E.C.E., Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India[5]

ABSTRACT: In this modern era, the whole world is getting shifted to "automation of everything". All our basic and complex requirements are automated. Similarly, the vehicle transportation system is also getting automated with many appealing features like driverless vehicles. The road infrastructures are also being upgraded to facilitate the automation. The overall objective is to improve the traffic control system for the vehicles. VANET (Vehicle ad-hoc networks) technology plays a vital role for increasing the efficiency of the vehicle communication framework. The VANET includes Vehicle to Infrastructure(V2I), Vehicle to Vehicle(V2V) and Vehicle to Everything(V2X). This system would monitor the traffic system in every region and detect violations of traffic rules and mis-behaviours caused to the V2I environment. The monitoring system would greatly decrease the damage caused to the humans, animals, and also to the road infrastructures. It improves the quality of V2I and V2X communication. This paper presents the concept of automation of vehicle monitoring systems so as to ensure the implementation of smart traffic regulations to govern the infrastructures, human carelessness, misbehaviour and other human mistakes.

KEYWORDS: Vehicle to Infrastructure, Vehicle to Everything, Vehicle to Vehicle, VANET, Traffic Violation.

I. INTRODUCTION

In most of the countries, the traffic rules and laws are simply broken with some bribes. So, the traffic system isn't terribly honest and is corrupted and less economical. Day by day, the mortal rate because of road accidents is additionally increasing quickly. To beat these issues, the simplest resolution is to convert the manual control system to digital control system. By digitalizing the system, the vehicles would get machine-driven and therefore the good roadways will be enforced simply. Because of the growing demands for the protection and additional intelligent transportation, the VANET encompasses a bigger responsibility. As human life is additional precious the effective communication between the vehicles infrastructures also plays a significant role. The Vehicle ad-hoc network paves the approach for efficiently increasing the communication and therefore the interaction. This could lead to less traffic, scale back the crime rates and conjointly the fatalities caused. The other main aim is to extend the output and information measure of the system for the Traffic monitoring system. Ad hoc network consists of Wireless mobile nodes and does not consist of any fixed base station infrastructure and also the centralized management. Here all the nodes perform as a router and also as host. These nodes move arbitrarily and communicate with each other through various wireless links. VANET is a multi-hop wireless network, the packets here through various nodes to reach the required destination. Vehicular Ad-hoc Network supports various types of communications like features Vehicle-to-Infrastructure(V2I), Vehicle-to-Everything(V2X), Vehicle-to-Vehicle(V2V), Vehicle-to-Pedestrians(V2P) . VANET operates by the collection of existing traffic scenarios. The various other services provided by Vehicular Ad-hoc Network includes warning messages so as to reduce the number of road accidents and VANET Routing.

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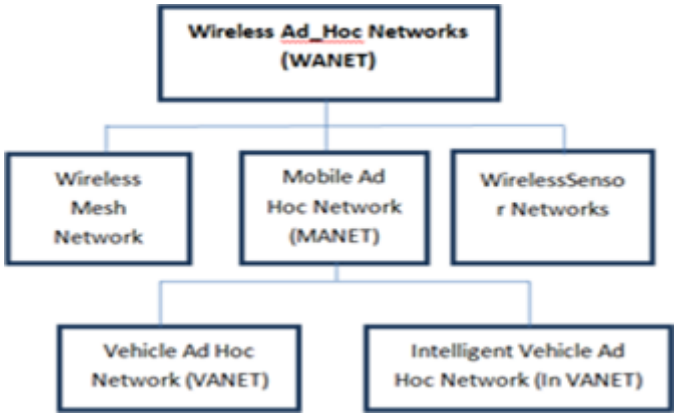

II. LITERATURE SURVEY

Quality of Service based Routing for VANETs

Guangyu Li, Lila Boukhatem, and Jinsong Wu have explicit that the most challenges undergone are given as follows: (1) the QoS of route isn't correct, (2) the strategies of QoS estimation aren't economical, (3) the routing alternatives are enforced by suggests that of the unfinished or native QoS, and (4) the routing exploration algorithms aren't effective and adjustable during this paper, associate adjustable QoS based Routing for VANETs referred to as AQRV is projected to traumatize the same issues. First formulate this route choice issue as associate optimization downside, associated proposed an ACO-based rule to resolve this NP-complete issue.

Fair Sharing of Bandwidth in VANETs

Brandy Torrent-Moreno and Paolo Santi have expressed the challenge to share the restricted wireless data rate for the exchange of protective data during a totally deployed conveyance circumstantial network (VANET) especially, they studied that once the quantity of nodes causing periodic safety messages is simply too high during a specific space so as to realize a decent performance of protective protocols, they proposed to limit the load sent to the channel employing a strict fairness criterion among the nodes. A proper definition of this drawback is given in terms of a max-min optimization drawback with an additional condition of per-node maximality. What is more, they projected FPAV, an influence management algorithmic rule that finds the optimum transmission vary of each node, and formally proved its validity below idealistic conditions.

Vehicle management in Vehicle to Infrastructure (V2I) atmosphere

Shekhar Banerjeev and Divakar Harekal have planned that the traffic observance system must shift to a digital world of vehicles from manual vehicle management. Each RSU listens to any or all the neighbouring RSUs and OBUs for alerts that are being broadcasted over the air. Once all the alerts are received, the RSUs begin to broadcast its own alerts and messages to the opposite neighbouring OBUs. They need bestowed an inspiration of communication between machine-driven vehicles and semi-automated vehicles and therefore the infrastructure that might be enforced for swish regulation of traffic, and conjointly provides a couple of rules for governing such infrastructure. The infrastructure ought to be pretty much secure, robust, reliable, trustworthy and quick- smart-responsive.

II. PROTOCOLS AND MOBILITY MODELS

So as to produce transport services, there's a desire permanently routing protocol, which may trot out all the challenges of VANET. VANET is a dynamic network, therefore it's a difficult issue to be able to get at run time. VANET routing protocols are classified into 3 categories: proactive routing protocol, reactive routing protocols and position based mostly routing protocols. Proactive routing protocol, that invariably maintains routes from supply to destination by sporadically changing routing table example OLSR, wherever reactive routing protocols start route computation solely on demand basis, AODV. Position based mostly routing protocol computes routes supporting the physical position of the nodes, by victimization GPS. Quality models replicate as the important behaviour of traffic on

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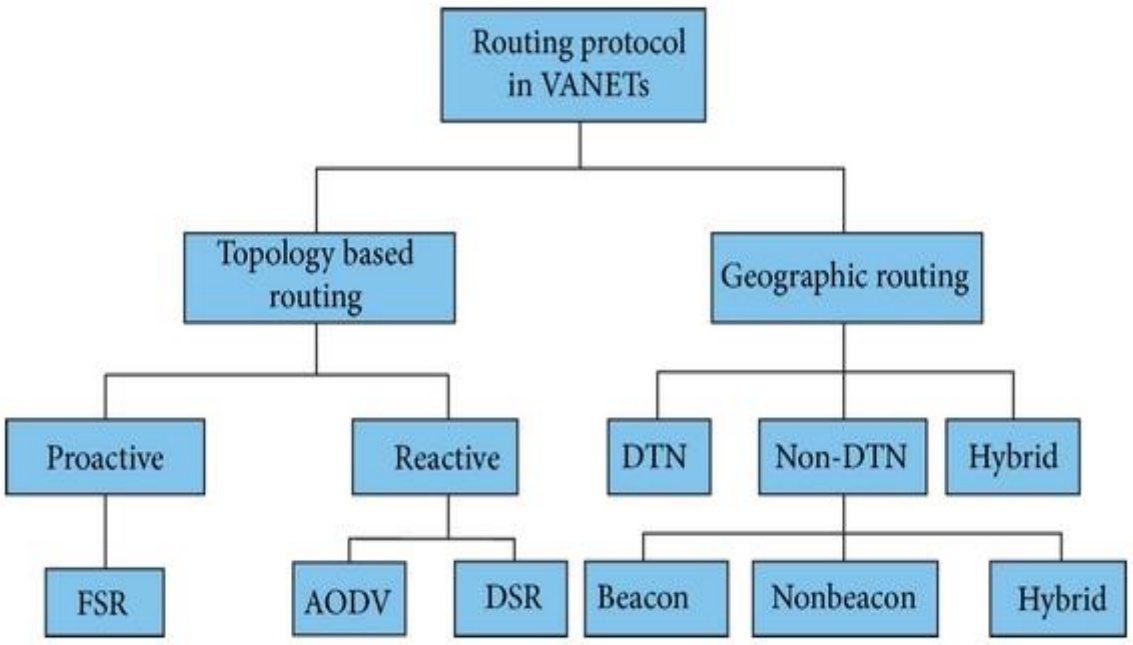
the road. One important side whereas simulating VANET is the use of quality models. There are many quality models like random patterns, graph constraints unremarkably employed by VANET researchers. However, one downside with these varieties of models is that they do not replicate real behaviour of traffic patterns.

They ignore some important aspects of the important world traffic like queuing of vehicles at road intersections, traffic lights and traffic signs, pedestrian movements, acceleration and speed consistent with neighbouring vehicles, reordering and lane ever-changing behaviour of drivers. This paper provides a close survey of routing protocols utilized in VANET and explains well blessings and drawbacks of every routing protocol. This paper conjointly provides a close survey of quality models and quality model generation tools with their classification.



Classification of VANET Routing protocol

III. METHODOLOGY

The communication modes in the VANETs are of two categories, Vehicle to Infrastructure and Vehicle to Everything. V2I communication is similar to V2V communication. It is the exchange of data between the vehicles and road infrastructure wirelessly. V2X (Vehicle to everything) is the communication between a vehicle and all the entities available. The VANETs consist of on-board units (OBUs). They are mounted in all the vehicles. Here each and every vehicle is considered as a node. The VANET also consists of Road Side Unit, Basic Safety Messages and Dedicated Short Range Communication.

With the help of Dedicated Short Range communication (DSRC) protocol, the information is broadcasted and exchanged through Road Side Units and also to the nearby vehicles. The vehicle information like vehicle location, speed, and traffic conditions are considered for the actions like rerouting and avoiding the possibilities of traffic emergencies.

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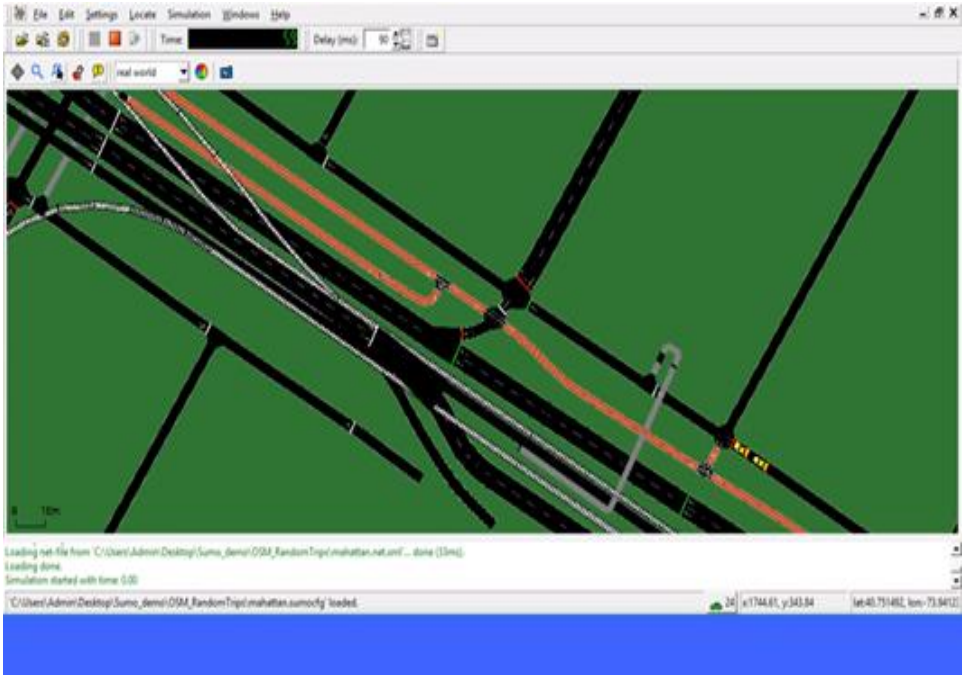
Traffic Simulation

To simulate the dynamic route planning, SUMO is employed. SUMO is Simulation of Urban MObility. It provides the feature for modelling intermodal traffic systems. The system includes road vehicles, public transports, pedestrians, lamp posts, and all other road side units. It facilitates simulating traffic demands. The realistic map of the required place can be generated.



Traffic generation using SUMO

VANET Simulation

The VANET considers the vehicles and RSUs as a node in the network. The VANET simulation is done with the integration of SUMO and NS3. The data that are necessary for the traffic is generated with the help of Simulation of Urban MObility. The traffic parameters are then exported to the Network Simulator. In the Network Simulator, each vehicle is able to send and receive knowledge packets into/from a shared medium.

Network Simulator (NS3)

Network Simulator is employed to form several virtual nodes. It's a distinct event used for networking analysis. Similar to it's previous version, NS3 mainly depends upon the C++ programming language for the implementation of the simulations. However, it does not use TCL scripts to manage simulations, being them additionally enforced in pure C++ (python bindings also are provided). The goal was to form an additional descendible and easier network machine, aligned with fashionable analysis wants associated to develop it as an ASCII text file machine. NS-3 integrates the subject ideas and code from GTNetS, a machine with smart measurability characteristics. Besides performance enhancements, NS-3 was designed to produce extensibility, permitting the event of latest models. The largest advantage is that the continuous maintenance and ascent thanks to an oversized development community. NS-3 permits nodes to own numerous network devices with totally different radio access technologies, like 802.11p, LTE, UMTS or IEEE 802.16 (WiMAX). NS-3 has additionally been extended to support parallel simulations on multi-core architectures and additionally to permit distributed simulations.

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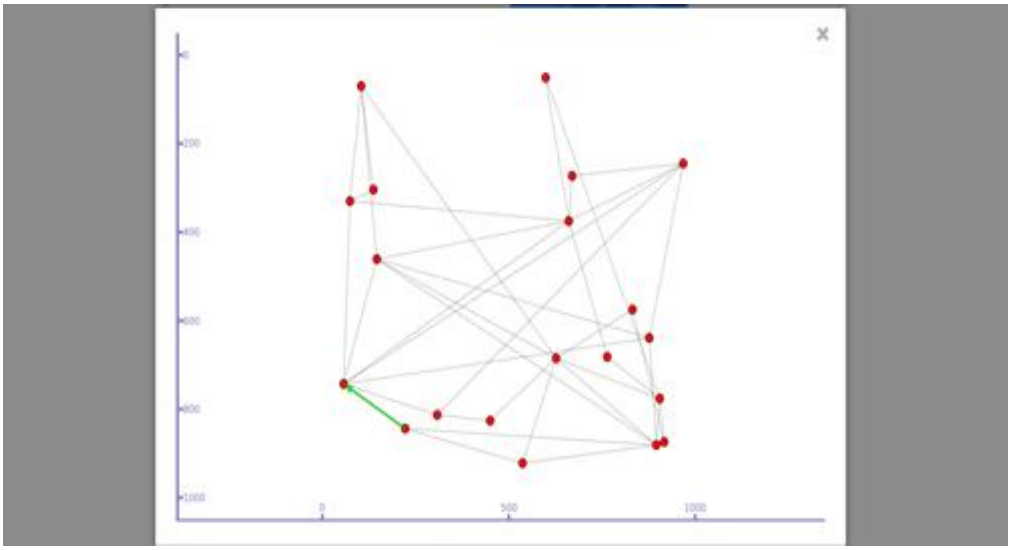

VANET Simulation using NS3

IV. CONCLUSION

This paper briefly introduces the Vehicular Ad hoc Networks. In today's modern world, the automation industry mainly focuses on the automation of all high-end vehicles. It also focuses on the implementation of V2I and V2X communication in all the automobile vehicles. This paper mainly concentrates on the algorithms that efficiently increases the throughput and bandwidth of the communication between V2I and V2X. The other main aim is to increase the Quality of Service of the communication. With help of this application a proficient infrastructure can be developed, so as to build a strong traffic management system. VANETS plays a major role in developing such management systems. Safety related applications concentrate on increasing safety of the passengers by interchanging the necessary information through vehicle to another vehicle or through vehicle to infrastructure. VANET greatly differs from other Wireless Sensor Networks or Mobile Ad hoc Networks by the node heterogeneity and dynamics.

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