HIGHWAY ACCIDENT PREVENTION USING VANETS

J.BUVANAMBIGAI, NAGINENI DHARANI, S.M.BHAGHIRATHI,PRIYANKA DAS

[1] *UG Students,Department of Computer Science and Engineering,SRM University ,Tamil Nadu,India*
[2] *UG Students,Department of Computer Science and Engineering,SRM University ,Tamil Nadu,India*
[3] *UG Students,Department of Computer Science and Engineering,SRM University ,Tamil Nadu,India*
[4] *UG Students,Department of Computer Science and Engineering,SRM University ,Tamil Nadu,India*

ABSTRACT

Day to day population has been increased in India, leading to massive real-time road traffic. Security has turned into a fundamental issue for governments and vehicle producers recently. The aggregate number of vehicles has encountered an astounding development leading to highway accidents. The improvement of the new vehicular advancements has moved organizations and other foundations for enhancing vehicular security on the problems with highway accidents. The focus of the project is to achieve better performance by implementing vehicle 2 vehicle communication scenario with weighted cluster algorithm(WCA).WCA is widely used for analysis in VANET environment. WCA shows that vehicular movement is based on the cluster formation algorithm steps. The intention of this project is to analyze how much distance and time has been covered to form the cluster. In WCA, each vehicle on the road will be considered either a cluster head or a cluster member of different clusters becoming gateway nodes. Using this concept, this project will improve the performance with the help of NS2. NS2 is an open source simulation tool that runs on Linux. It is a discrete event simulator targeted at networking research and provides substantial support for simulation of routing, and implementation of various protocols such as UDP and TCP over wired and wireless networks.

Keyword : - *VANET,NS2,ITS,RSU,RAP,WCA,etc.*

1. INTRODUCTION

The highway roads should be efficiently utilized for social and economic development of a nation. Insufficient infrastructure for transportation might slowdown the progress of a nation. The delay in transportation, increased traffic jams, raise in fuel cost, air pollution due to exhaust emissions and fuel shortage in future are very serious problems to address. In this regard, the researchers took keen interest and arrived at different models such car following model, lattice hydrodynamic model, etc. The World Health Organization (WHO) report says that above 1.24 million people die because of road traffic accidents. Globally, road traffic accidents are ranked as eighth cause of deaths and injuries. In India, more than 4 lakh road accidents have taken place and a total of around 2 lakh deaths and 5 lakh injuries were reported during 2016 and it seems increasing by 1.4 percent every year. In 2017, the global vehicle population is found to be 1.2 billion and is expected to reach 2 billion by the year 2035. The vehicle population has drastically increased over the past two decades and proportionally the highway road traffic has also increased. This means that the number of road accidents increase every year throughout the world. These road accidents cause increase in death and injury rates and this in turn cause social and economic damage to the nation. In many developing countries like India, development of highway road infrastructure is not in proportion to the increase in vehicle population. Lot of research is required in this field to make highway infrastructure as feasible and

viable for modern vehicles. Throughout the world more initiatives are taken for highway road traffic safety in order to reduce road accidents and improve the injury and death rate.

The objective of this paper is to design a scheme for preventing highway road traffic accidents. A Road Accident Prevention (RAP) scheme is proposed in this paper for VANET to enable and enhance Intelligent Transportation System (ITS).

The highway road accidents are categorized as initial and secondary accidents. The RAP scheme alerts the vehicles traveling in the road with an early emergency warning to prevent them from initial and secondary accidents. The RAP scheme uses both fixed Road Side Unit (RSU) in highway and the vehicles traveling in the highway, for accident prevention process. The RAP scheme aims to improve the performance of data dissemination in VANET by delivering the Emergency Warning Message(EWM) to the vehicles needed within the stipulated time. Here, dissemination is the process of delivering messages from a source node to all other nodes in the current network.

In VANET, achieving high notification and low end-to-end delay are very difficult due to reasons such as dynamic vehicle density, high mobility of vehicles and limited bandwidth. But in vehicle or road safety applications, robust and delay tolerant dissemination is a must and this can be implemented with the features of delay tolerant network communication. Emergency Situation Prediction Mechanism (ESPM) performs prediction of emergency situation (ie a highway road accident) in highway roads and reports this to the near-by RSU. Based on this prediction information, the RAP scheme can initiate the prevention process.

The RAP scheme is First, based on successful prediction of emergency situation in advance by using protocol like ESPM, then RSU generates an Emergency Warning Message (EWM). Second, the structure of EWM consists of information such as (i) EWM ID (ii) source (RSU) ID (iii) vehicle ID (iv) position of the emergency causing vehicle (v) speed of the vehicle and (vi) travel direction of the vehicle. Finally, the EWM is instantly disseminated to all the vehicles which hold the high Risk Factor (RF) and travel in High Risk Zone (HRZ). These vehicles travel both within and outside the RSU's coverage (extending the coverage area of RSU by using the VBN structure). Suppose if the vehicles receive the EWM, they make necessary decisions such as slowing down, performing lane change, de-touring and choosing alternate routes. The role of the driver in the road accident prevention is vital. The reaction time of the driver for acceleration or deceleration adjustment is strongly influenced by perturbations and traffic interruption probability.

The performance of RAP scheme is experimented by using simulation in Network Simulator (NS-2). The simulation results show that the RAP scheme is promising towards improvement in performance by dissemination of EWMs to the vehicles for highway road accident prevention.

2. SYSTEM ARCHITECTURE

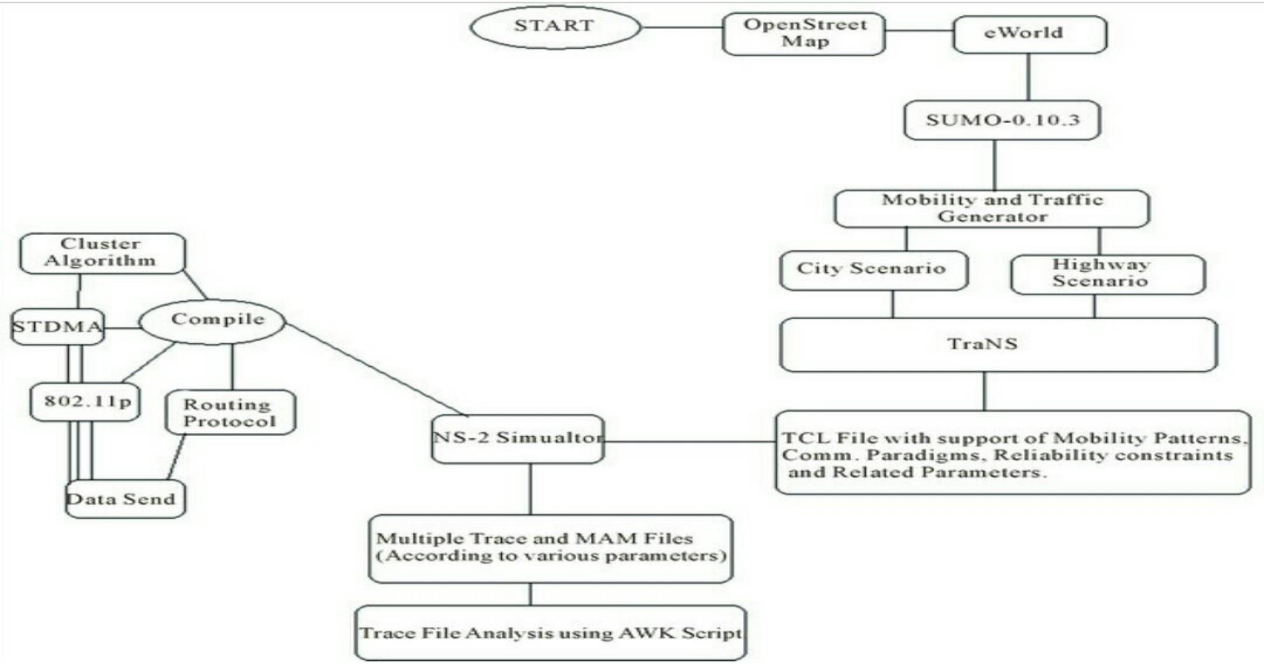

Fig-1:System Architecture using Vanets and NS2

ITS and RSU sections are as shown above respectively.The RAP scheme has been used by the support of Vanets.We have discussed about city scenario and highway scenario.WCA algorithm is used to support NS2 and SUMO.So, the implementing of this project will be easy.TCL file with the support of Mobility Patterns,Commands,Paradigms,Reliability constraints and related parameters.

3. EXISTING SYSTEMS

- VANETs can use any wireless networking technology as their basis
- The most prominent are short range radio technologies like WLAN and ZigBee.
- In addition, cellular technologies or LTE can be used for VANETs.
- The latest technology for this wireless networking is visible light communication[VLC](Infrared transmission and reception).

4. PROPOSED SYSTEMS

In this project we use weighted cluster algorithm(WCA)is proposed to prevent accidents in a highway scenario. With the real time accident information collection and NS2 we focus on to achieve better performance by implementing vehicle 2 vehicle communication scenario.

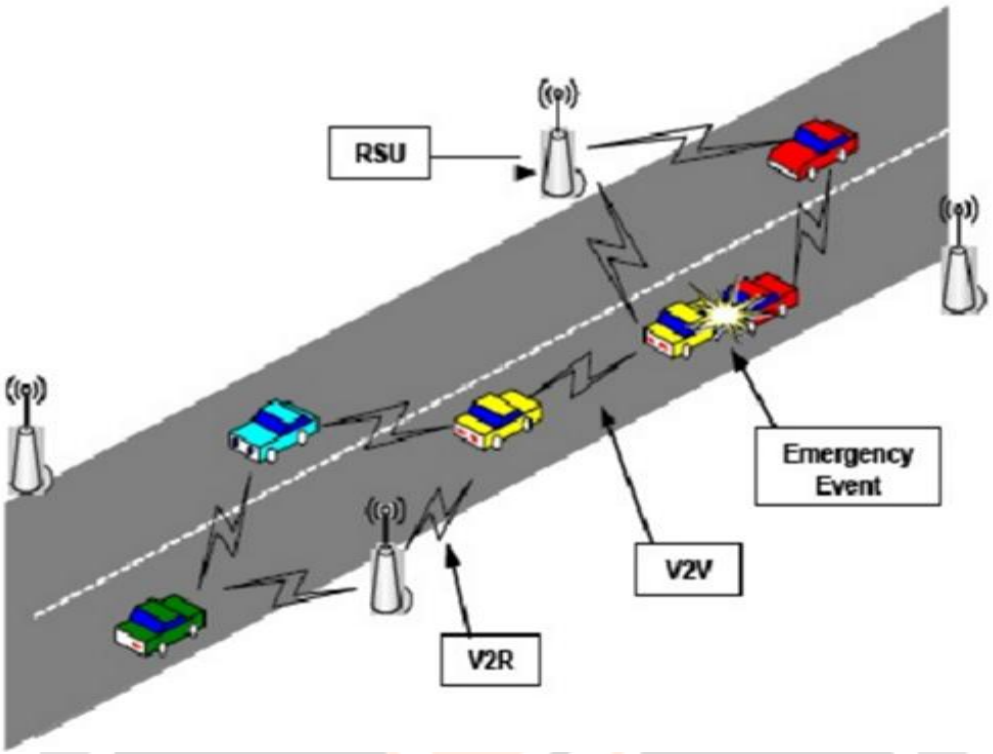

Fig -2: **Model of the Vechicular Ad Hoc**

5. HARDWARE AND SOFTWARE REQUIREMENTS

- Hardware Requirements: Laptop, vehicles, highway model, Ad-hoc Network, ITS (Intelligent Transport System)
- Software Requirements: Network simulation software like NS2 software, internet connection, radio frequencies

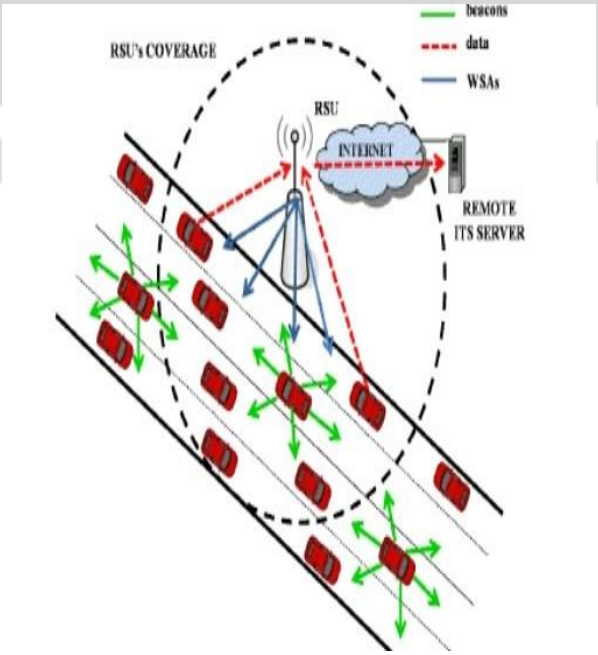

Fig -3:System Module 1

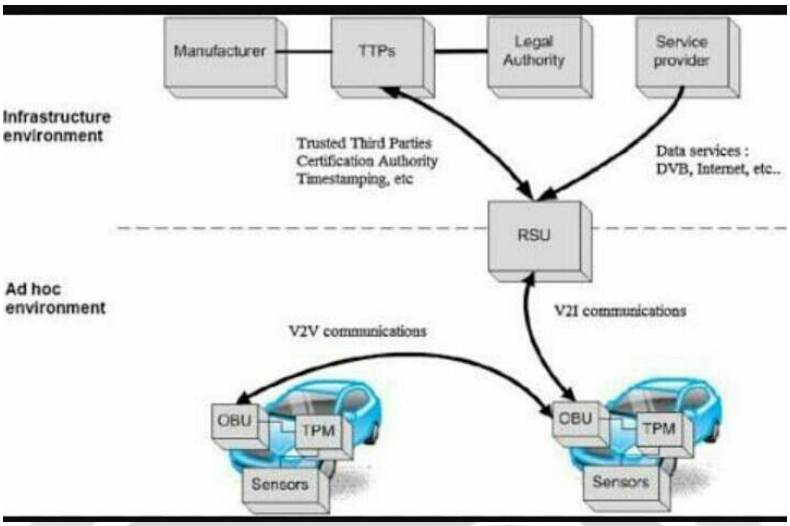

Fig -4:System Module 2

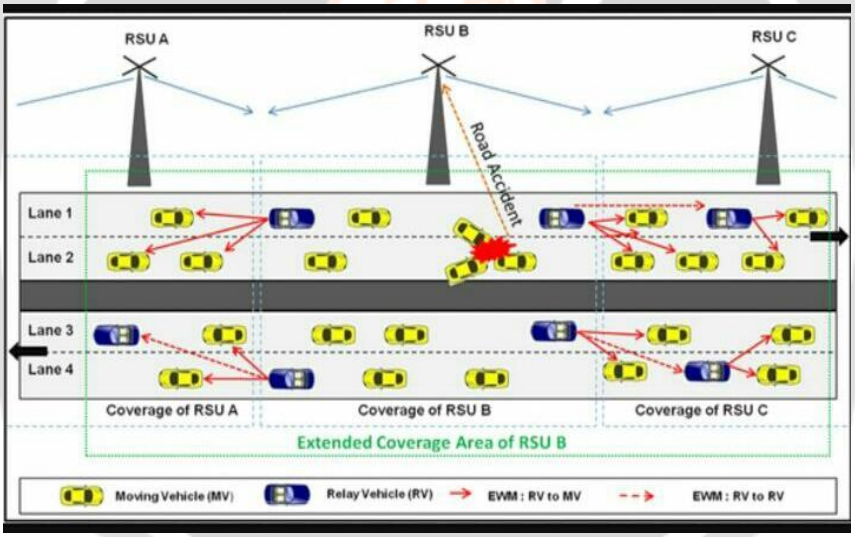

Fig -5:System Module 3

6. CONTRIBUTION OF OUR WORK

1. Proposing a reliable and parametrized design for avoiding car-pedestrian collisions using VANET-infrastructure to LTE network communication to retrieve and infer the pedestrians movements near the area surrounding the car's path.
2. Defining the collision zone, which is the area surrounding the car's path for which locations of pedestrians should be acquired from the LTE network. The coordinates and dimensions of the zone automatically adapt to the speeds of the car and pedestrians, and the width of the road.
3. Designing a car clustering algorithm based on overlapped breaking distances to reduce the load on the infrastructure.

4. Proposing an adaptable pedestrian position reporting design that adapts the frequency of reporting based on the distance from the VANET's road side unit, to which the cars report their locations and speeds, and from which they receive alerts. This is meant to reduce the load in the LTE network.
5. Producing experimental results using the NS2 network simulator and the SUMO utility to have cars move on roads of a selected map. The results illustrate the effectiveness of the design in detecting pedestrians in the path of the cars.

7.PROBLEM WITH EXISTING SYSTEM

Highway traffic load is formed by numerous factors; some are unsurprising like street development, surge hour or container necks and some are eccentric like mischance, climate and human conduct. Drivers, unaware of traffic load ahead inevitably go along with it and expand the seriousness of it. The more extreme the traffic burden is, the additional time it will take to clear once the reason for it is improved or eliminated. The capacity for a driver to know the road conditions will empower him/her to look for alternate ways to go sparing time and fuel. At the point when numerous drivers have this capacity, traffic load, particularly those identified with confined incidents, for example, mischance's or interim interruptions will be less extreme and just the vehicle in the prompt region of the occurrence, at the season of the occurrence, will be influenced. This would prompt an a great deal more productive utilization of our street foundation. Increase traffic burden result from driver conduct and the absence of wide distance data. Current systems, such as helicopter traffic reports are effective because from the air we can get a good picture of a congestion area, where it starts, where it ends and how slow or fast is moving, however these reports require enormous resources and are therefore limited to major metropolitan areas. In order to make ready drivers with useful information about traffic conditions a system must: i) Recognize the traffic load, its position, seriousness and boundaries. ii) Relay this data to drivers inside of the congestion and those heading towards it. These two requirements must be satisfied by any traffic detection system. To identify the traffic load an observer, like one riding on the helicopter, needs to see vehicles that are a long distance away from each other, and outside of each other's line of sight. A visual picture of the congestion can only be obtained from a vantage point, well above the road surface. For vehicles within the congestion to form their own picture of congestion they need to collaborate using V2V (vehicle-tovehicle) or V2I (vehicle-to-infrastructure) communication. Once a clear picture of the increase load has formed, this information needs to be relayed to vehicles away from the congestion so that vehicles heading towards it can take evasive actions avoiding further escalation its severity.

8. PROPOSED METHODOLOGY

A system is proposed which provides the high level conceptual way to resolve the problem identified using real time simulation using various tools and techniques and also provide a comparison between different road safety techniques. The solution and application involves following steps:

- Simulation scenario: To simulate the contribution of the proposed highway mobility model an assumption is made to for a high traffic highway with real time traffic simulation tools.
- Vehicle to Vehicle Communication (V2V): V2V is a technology which enables the vehicles to communicate with each other.
- Vehicle to Infrastructure Communication (V2I): Vehicle to-infrastructure communications is the wireless exchange of data between vehicles and highway infrastructure. In this phase vehicle to infrastructure communication is simulated where, the vehicle and decision server communicate with each other for providing the traffic, accidental information over highways.
- Vehicle to Road Side Unit (V2R): In V2R communication, Road Side Units (RSUs) keep the data of moving nodes i.e. vehicle like speed, distance from RSU, and route information of vehicles.

This is a communication infrastructure used to support the route information during traffic over highway. Therefore using the hybrid of V2V, V2I & V2R creates an effective accidental prevention system. The major part of the proposed system utilizes the following devices:

1. Decision server: That is additional functional server which collects information from RSU nodes about the traffic (if the nodes are under load condition then power consumption in node is high).

2. RSU: Road side unit (RSU) devices are working as Wi-Fi or access point for vehicle nodes and for similar nodes (other RSU) these devices are working as connected link nodes. These RSUs are connected using a backbone bus and in direct communication with the server.
3. Vehicle: These are MANET fully functional devices which are able to send and receive data from other devices and also behave as router node.
4. Improvements: This is our main goal to achieve the following prospective over the proposed research work.

9. IMPLEMENTATION

The entire system implementation of proposed approach is required to accomplish in 3 different scenarios. In first, we are finding the appropriate communication approach for vehicle 2 vehicle communication using Weighted Cluster Algorithm (WCA). The main aim behind using this algorithm in communication is to enhance the performance of network in complicated scenarios. In WCA we need to find the quality of communicating nodes(V) by which the stability of network parameters becomes also stable. Therefore in this WCA, we are going to consider four different factors that are related to direction of speed and vehicles. The key parameters are connectivity, mobility (distance), and Speed. Connectivity parameters indicate that vehicles are in same range or not. Mobility shows the distance among the vehicles. Speed shows the how fast vehicles are travelling on highway. The performance of vehicular network is calculated on parameters like throughput, Packet Delivery Ratio, Routing Overhead and End-to-End Delay for different number of vehicles (nodes).

10. CONCLUSIONS

VANET is a network of vechicles where nodes are capable to communicate with each other.This work evaluated the performance of VANET with parameters i.e. routing overhead,packet delievery ratio,end-to-end delay nd throughput.The main issue with the networks is spreading messages to vechicles on high speed.Integrating I2V,V2R and V2V approach can provide solution to this.

11. REFERENCES

[1]. Azzedine Boukerche,Horacio A.B.FOliveria,Eduardo F.Nakamura,Antonio A.F.Loureiro-Vechicular Ad Hoc Networks:A New Challengs for Localiztion-based Syatems.A.Boukerche

[2]. Choffnes,David and Fabin,Bustamante E.STRAW-An integrated mobility and traffic model for VANETs.International Command and Control Research Technology Symposium(CCRTS).June 2005

[3]. Harri,J.,et al.vanetMobiSim:Generating Realistic Mobility Patterns for VANETs.VANET'06 ACM 1-59593540-1/06/0009.September 2006

[4]. Potnis,Niranjan and Mahajan,Aathulya.Mobility Models for Vechicular Ad Hoc Network Simulations.ACM SE'06.March 2006

BIOGRAPHIES

	J.BUVANAMBIGAI Under Graduated Student,Department of Computer Science and Engineering,SRM University,Ramapuram,Chennai,TN.
	NAGINENI DHARANI Under Graduated Student,Department of Computer Science and Engineering,SRM University,Ramapuram,Chennai,TN.
	S.M.BHAGHIRATHI Under Graduated Student,Department of Computer Science and Engineering,SRM University,Ramapuram,Chennai,TN.
	PRIYANKA DAS Under Graduated Student,Department of Computer Science and Engineering,SRM University,Ramapuram,Chennai,TN.