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Early Alert System in VANET

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Abstract— Global positioning system can be used to get the position of the vehicle and which can be shared with other nodes in the network. For VANET application this positioning information is the central requirement. In case of emergency not all the vehicle get affected in network so it has to be multicast as broadcasting of alert packet is not feasible, but listing the node to be considered for multicast is challenging task as every vehicle cannot hold the location information of the entire vehicle in the network. Calculating the list of relative vehicles position is depending on the traveling direction, bearing angle and the distance by the great circle algorithm. Hence the proposed system is designed and developed to find out the relative position between multiple vehicles where the road side unit will manage all the vehicle information and detect the failure vehicle and calculate the detail of the vehicles get affected by the failure vehicle using the geo positioning and multicast alert packet to identified vehicles. This will narrow down the broadcasting scenario and prevent the traffic conjunction due to traffic density. Thus multicasting will reduce the problems caused by broadcasting. The proposed system consists of two modules that is early alert system and traffic density calculation for retiming of the green signal at the intersection of the road or at the square where according to the number of vehicles the green timing will vary and will be directly proportional which will also allow on demand routing.

Keywords— GPS, VANET, Multicasting, Traffic density, RSU, TCU.

INTRODUCTION

The proposed system is designed and developed to find out the relative position between multiple vehicles for the early alert system. The great circle algorithm is used for calculating the traveling direction, bearing angle and the distance between the multiple vehicles to find out the relative position between them. GPS device provides vehicle location even these locations can be shared with other vehicle. Using GPS device protocol data system can get the direction for which system need to parse & process GPS data Bearing angle: Degree on earth co-ordinate system with respect to vertical center of earth is called as bearing angle. As the accident occurs the information goes to the roadside unit then the RSU communicates with the other vehicles and then multicasts the alert message to the vehicles at the back of the vehicle whose accident has been taken place. The second module is retiming of green signal. Congestion in road traffic is a serious issue and timing of traffic light is pre-defined or fixed in the traffic light and it is independent on traffic density. It is the Priority Based Signal Management in traffic system, which deals with traffic load in each side of lane during high-density traffic on road at specific time. The Improved Priority Based Signal Management in Traffic System is used in heavy traffic roads and the junction, which is based on the time as well as the density, and the time delay will be controlled and density will also be controlled. If the traffic density is high on particular side more priority is given for that side. The Road Side Unit (RSU) continuously keeps watching density on all sides and the green signal is given to the side on priority basis, where the camera detects high density. Priority based signaling is followed here. By using this system traffic can be cleared without irregularities[1]. Maximum density of traffic will allow traffic with maximum timing assigned Minimum density of traffic will allow traffic with minimum timing assigned.

Fig.1: Proposed Model

METHODOLOGY

Based on previous studies reports it is seen that design of early alert message advertising model with reliable routing protocol for multicast messaging has to be done to reduce the traffic congestion. RSUs assists the traffic safety messaging, which delivers early alert safety messages to dedicate vehicles using relative positions by multicasting the alert message to only those vehicle which is going to get affected by accident. Main motive is to improve the VANET connectivity for safety message delivery between the vehicles and the RSUs. Multicasting of Alert Messages is done here. Topology is highly dynamic and rapidly changing in vanet. VANETs provides raveler information, develop comfort application and traffic flow is improved by Popularity of multicast routing protocols has increased the cause is, the VANET routing protocol provides many to many and one to many communication for different application of VANET [8]. Most of the existing multicast routing protocols are designed to satisfy safety applications[1] however there are some non-safety applications that also need multicast routing protocol. Since human spend plenty of time driving their cars daily and along the highways requires a precise management to improve traffic flow and decrease the number of deaths and injuries in vehicular collisions, and eventually make travels more pleasant due to number of increasing cars.

The main goal is detecting relative position and multicasting the critical messages. The additional scenarios implemented are density based green light retiming and priority based green time control for Emergency vehicle.

THE GREAT CIRCLE ALGORITHM

The great-circle algorithm is used in early alert system. Due to lack of real time implementation one can't understand the real problems and the real time scenario issues. In VANET V-2-V is most demanded scenarios for communication but with whom to communicate is the issue. As in VANET information sharing is the most important point but it's a still problem to define a exact message receiver. Human can decide to send message to particular person after looking toward its position, but machine can't do this. GPS device provides vehicle location even these locations can be shared with other vehicle. But vehicle can't get relative position of each other in this way. Proposed system is designed and developed to find out the relative position between multiple vehicles. Here road side unit will manage all the vehicle information and detect the failure vehicle and calculate the detail of the vehicles get affected by the failure vehicle using the geo positioning and multicast alert packet to identified vehicles. This will narrow down the broadcasting scenario and prevent the traffic conjunction due to wrong message delivery to unwanted vehicles.

We can demonstrate everything in simulation by implementing the algorithms on imaginary locations. It is not feasible to setup test bed, as we need real A-GPS and proper environmental set up. In real world vehicle are at desired distance so that changes in every geo-point can be gathered and also RSU can be implemented. So RF based node for intercommunication between vehicles to RSU to vehicle with GUI based scenario Simulation of all modules is justified and also tracing of desired location using GPS. Using Vb.net the simulation is performed for early alert system and retiming of green signal.

Firstly we have to design and develop vehicle node having traveling direction and the location information. Then develop a node, which will work as a roadside unit and manage all vehicle location information and also manage detection of failure node in the network. Once the failure node detected it will calculate the relative position of other vehicle and multicast the messages to particular vehicle.

Many time roads are traffic free still the timer will take its default time. We need a system to calculate the density of traffic and control the signal timer. Maximum density of traffic will allow traffic with maximum default timing assigned. Minimum density of traffic will allow traffic with minimum defined timing assigned. For this calculation of number of communication nodes is to be done first then RSU and TCU communication with TCU increase or decrease the signaling time. Sensors are to be used to sense the number of vehicles.

The main objective of the proposed system is to design and develop to find out the relative position between multiple vehicles. Here road side unit will manage all the vehicle information and detect the failure vehicle and calculate the detail of the vehicles get affected by the failure vehicle using the geo positioning and multicast alert packet to identified vehicles. This will narrow down the broadcasting scenario and prevent the traffic conjunction due to wrong message delivery to unwanted vehicles.

The other objective is traffic density calculation retiming of green signaling so the system is designed and developed to reduce traffic Congestion in road traffic is a serious issue and timing of traffic light is pre-defined or fixed in the traffic light and it is independent on traffic density. Designing a framework for a dynamic and automatic traffic light control system and developed a simulation based model with codes in to help build the system. The system will examine the possibility of deploying an intelligent real-time traffic signal controller, which will receives information transmitted from vehicles. Utilizing this information to optimize the traffic signal scheduling at the intersection.

The system describes to overcome the problem of traffic jam on intersection at the Traffic Signal system. System also proposes the Priority Based traffic light signaling which help to assign the priority to the emergency vehicles. The Roadside Unit (RSUs) will receive information transmitted from vehicles then utilizes this information to optimize the traffic signal scheduling at the intersection. To monitor the density of the traffic, we will keep the Road Side Unit (RSU) besides the road and depends upon the images from the Road Side Unit (RSU), the delay of the traffic signals will be increase or decrease.

The roadside Unit (RSU) installed on every intersection will communicate with vehicle on road at either side, hence calculate number of communication nodes in order to calculate density. Roadside Unit (RSU) will transfer the collected data to the Traffic Control Unit (TCU) and then TCU increase or decrease the signaling time as per the calculated density. The Emergency vehicles having transmitter will send the signal to the receiver on intersection from long distance so that the particular lane's traffic light will be green and allow vehicle to bypass. After passing the emergency vehicle, the traffic system will functioning as per the normal operations as it is. This will gives authority to the permitted vehicles only e.g. Ambulance, Police or Fire department vehicles.

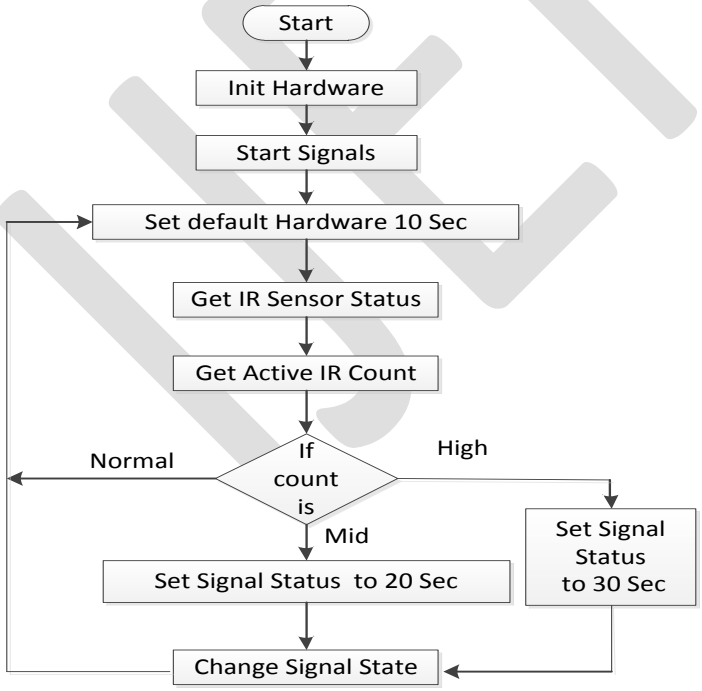

Fig.2: Flow Chart of Retiming of Green Signal

RESULT

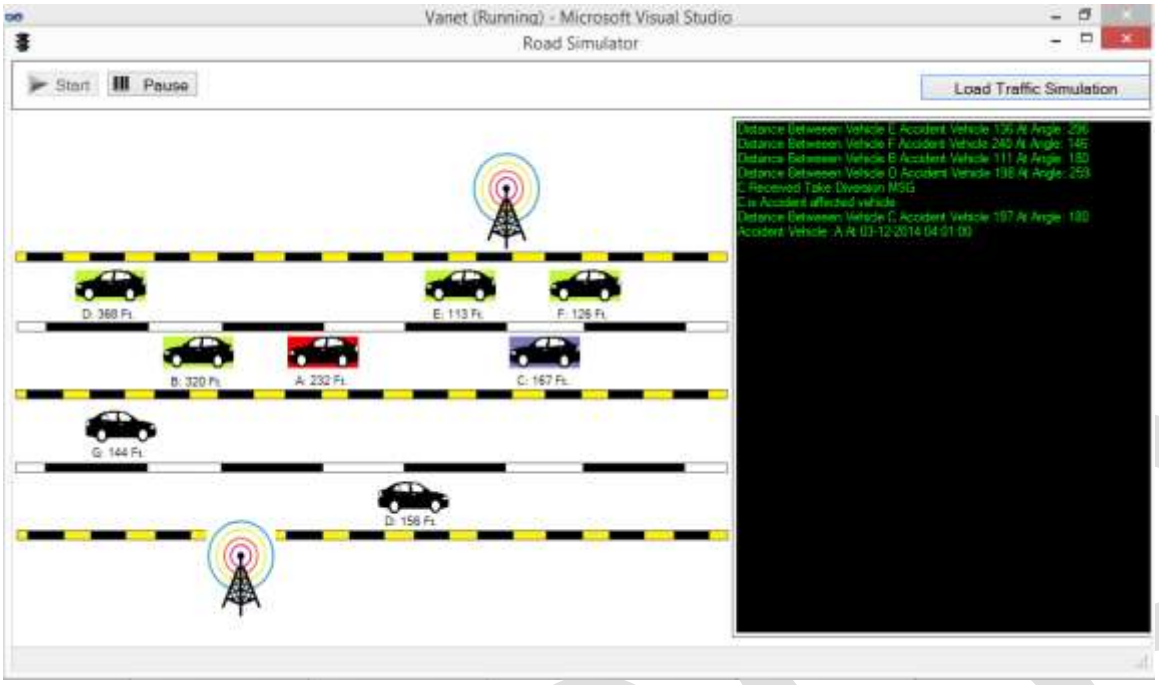

Fig.3: Early Alert System

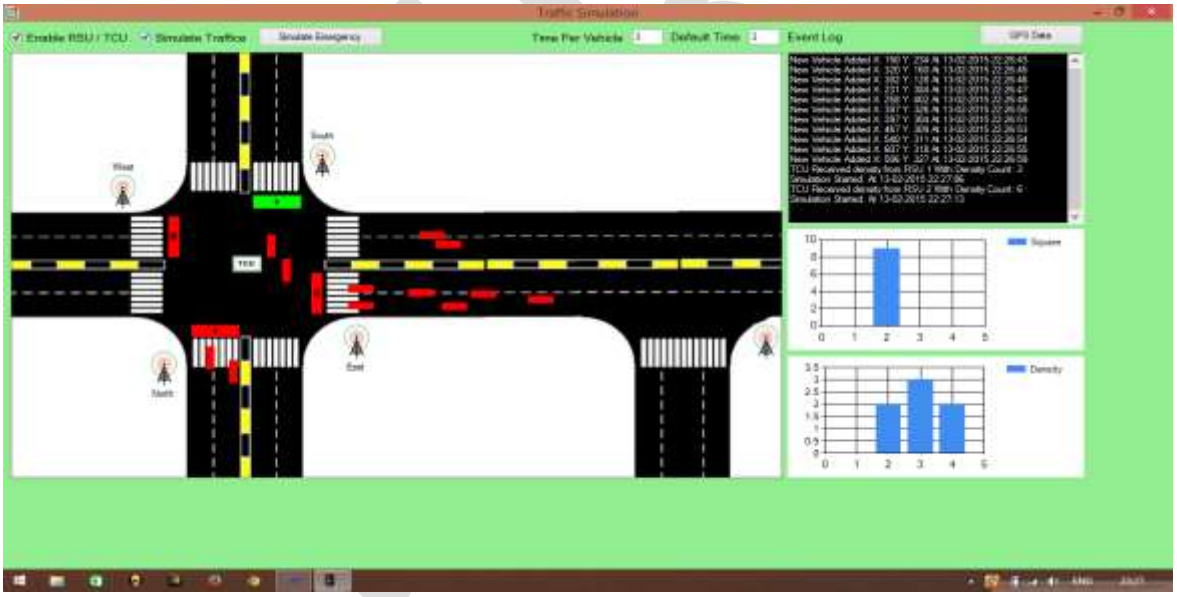

Fig.4: Traffic Density Calculation

CONCLUSION

The early alert system reduces the traffic accidents and reduces the traffic congestion by multi casting the alert message instead of broadcasting. The multicasting scenario warns the drivers and thus reduces the accidents. The main task is with whom to communicate Priority Based Signal Management in Traffic System shown how the Traffic Light Signal control, including with the implement of Traffic Scheduling Algorithm which is used to gain information from the vehicle position and the speed. The acquired data from Road Side Units reschedule the traffic light timing according to the traffic condition for low or high-density road traffic. If the density of the road traffic is high then Maximum density of traffic will allow maximum default timing for traffic lights. Minimum density of traffic will allow traffic with minimum timing for traffic lights. If the traffic rate on both side is Equal or gap within traffic then according to arrival time traffic light signal set to minimized. The simulated result under high as well as low-density road traffic load.

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