

SOUNDLESS HORN USING AD-HOC NETWORK (VANET)

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Abstract - Noise pollution is the major concern that has been disturbing and harming the activity or balance of human life for ages and if not controlled can lead to serious consequences. Unwanted sound (noise) can damage psychological health. Noise pollution can also cause *hypertension*, high stress levels, hearing loss, sleep disturbances, and other harmful effects. The purpose of this document is to present an overview into overcoming the problems occurred by the excess noise pollution that is caused by an alarming increase of vehicles that create sound pollution by honking. By implementing soundless horn drivers can communicate signals and transfer soundless horn from one vehicle to another. The need of a honk arises when a driver wants to communicate to another driver regarding the overtaking he is about to make and that he needs some space to overtake or to notify some obstacle on his way and thereby clearing the path for him. Soundless horn makes use of ad-hoc network to transfer wireless data that will notify all the drivers about the indications or signals which they use to convey each-other just like the way horn works. Soundless horn would produce vibrations that would vibrate the device attached to the steering of the vehicle which would notify him the same way a horn notifies a driver about any movement. Since only a notification is required to alert drivers during driving, using a soundless horn would thereby help decrease the level of pollution caused due to unwanted honking of vehicles.

Key Words: Vehicular Ad Hoc Network, Vehicular Communications, Vehicular Routing Protocols, VANET, Cluster, Routing, Cluster Based Routing Protocol (CBRP)

1. INTRODUCTION

Noise pollution one of the major cause of pollution has seen a rapid increase in the levels of pollution due to the increase in use of vehicles all over the world and is tending to be a one of the major concern that needs to be controlled by the human being apart from other polluting factors. Noise pollution created by vehicles can lead to various disorders in human beings and it could also harm human health drastically. Horn in vehicles are just used for alerting neighboring drivers and pedestrians so a different approach was drastically needed to minimize the level of pollution created by the use horns all over the world. The use of soundless horn can be implemented in all vehicles in order to reduce the increasing levels of sound pollutions created by the increasing vehicles day by day.

Soundless horns would make use of ad-hoc networks to transmit data packets from one vehicle to other while driving through road or highways. Using this technology a little or no sound pollution would be created. The technology used makes use of cluster based routing protocol that is used to make stable topology of unsteady vehicular networks.

1.1 LITERATURE SURVEY

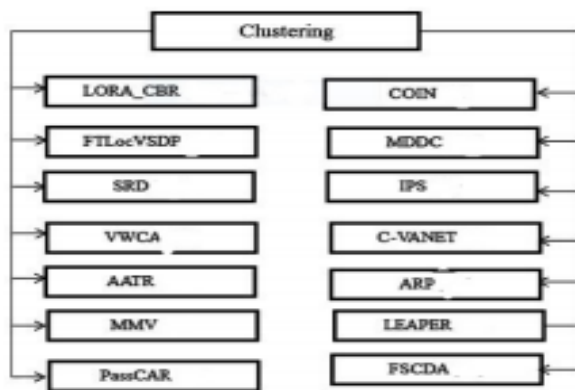
Vehicular Ad-hoc network or VANET were earlier introduced in 2001 under "car-to-car ad hoc mobile communication and networking" applications as a means to use technology for safer driving and decrease the accident caused by vehicles. Hence the use of this technology can also be used to overcome sound pollution caused by vehicles over the ages by using certain mechanism. This paper concentrates on the use of VANET protocol to exchange horn signals sent by drivers across the roads or vehicles as means of using horn to alert drivers in the vicinity.

1.2 ABBREVIATIONS

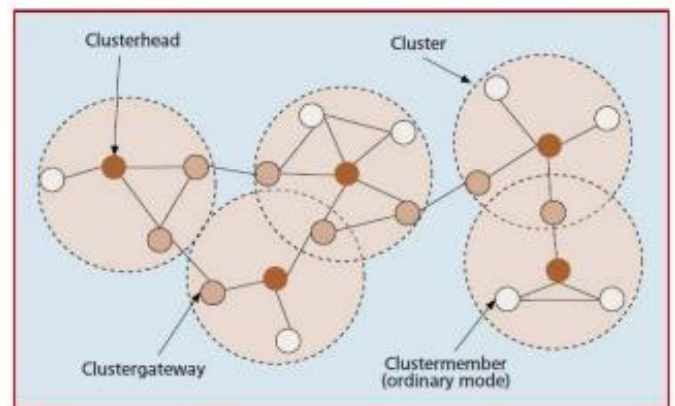
VANET: VEHICULAR ADHOC NETWORK
CBRP: CLUSTERING BASED ROUTING PROTOCOL
IEEE: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
OBU: ONBOARD UNIT

2. WORKING

VANETs follow the IEEE 802.11p standards assigned to Wireless Ad Hoc Vehicular Environment. Vehicle Ad-hoc network also known as VANET works on different protocols to transmit data from one node to another. Of all of the protocols that can be used effectively for communication Clustering based routing protocol (CBRP) is best suited of Vehicular Ad-hoc network communication.



Classification of Clustering based routing.



Clustering Mechanism

The advantage Clustering based routing protocol has over other protocols is that it helps to reduce the overhead involved in the network and delay of the network. And it also helps to increase the safety of the vehicles and it increases the packet delivery ratio. Cluster based routing protocol basically divides the vehicle into an overlapping (or non-overlapping in some of the cases) clusters that communicate with each other and increases the scalability of the network. [1]

Communication with the help of Cluster based routing protocol, a lot of efficiency is achieved as compared to communicating with other protocols and it also is not much expensive to be implemented. CBRT overcomes various restrictions such as longer coverage area, less loss of packets while transmitting data, great strength etc. [3]

Following are the features advantages and disadvantages of CBRT protocol:

ADVANTAGES:

- a) Minimize route discovery traffic and routing overhead.
- b) Uses "local repair" mechanism to reduce delay and new route discovery traffic.
- c) Increases the packet delivery ratio.

DISADVANTAGES:

- a) When increases cluster size, overhead on packet must be increases.
- b) The transmission time increases when cluster size increases.
- c) Communication complexity is increased.

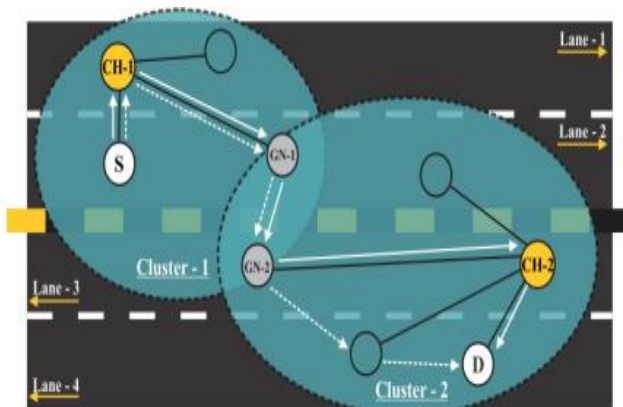
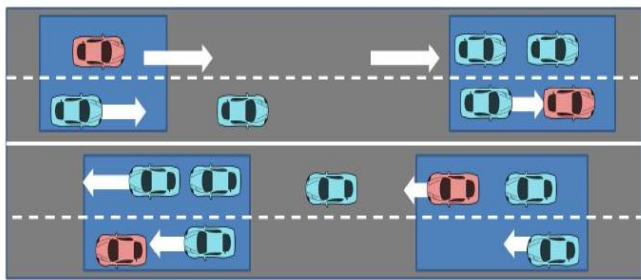


Chart -1: Name of the chart

In cluster based routing protocol a group of overlapping clusters forms a disjoint wireless network. Every cluster has its own cluster head, who helps maintains cluster formation by communicating with other nodes within the cluster range. In this process a node with a lowest ID is elected as a cluster head amongst all the nodes. Each node maintains its own set of table neighbor table and stores all the necessary details such as Neighbor ID, Cluster role in a node and its status of its link. The neighbor table is updated at each hello message which are broadcasted at a regular interval. Two Cluster head can inter-communicate with each other with the help of a special node known as the Gateway node. [2]

1. IMPLEMENTATION OF SOUNDLESS HORN IN AD-HOC NETWORK

Due to tremendous rise of noise pollution over the past years steps should be taken to control the level of pollution made by the honking of vehicles, which lead to the rise of soundless horn system, a system that works normally like the regular horns that are present all over the world but with different approach. Soundless horns would make use of Ad-hoc network or also known as VANET networks which exchanges wireless packets between different nodes based on cluster based routing protocol to transfer information from one vehicle to another. Each vehicle would contain OBU (On-Board Unit) i.e. a pair of transmitting and receiving device that would help transmitting and receiving the transmitted signal to and fro.



Cluster

Cluster Head Vehicle

Vehicles would transmit signals using the onboard circuits with the help of wireless Ad-hoc networks. These signals would be carried away along the road and received by the vehicle with the nearest range. Vehicles which would receive the signals which would notify the fellow driver with the help of a device which would be setup on the driver's steering wheel.

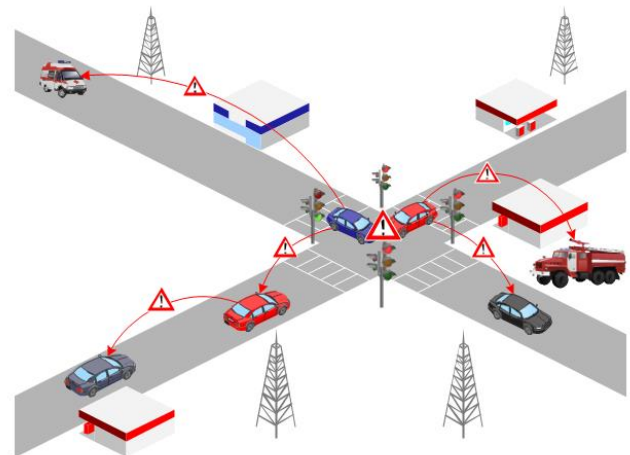


The device which would be setup at driver's steering wheel would comprise of a pair of vibrator that would vibrate when the receiver receives the signals placed at equidistance on left and right hand side of the vehicle. The signal which is received can be used instead of horn as the basic need of the horn is to alert all the drivers of the moves he is about to make.

The driver would also be notified by the orange color ambient light that is placed on both the sides of the steering wheel followed by vibrations on the steering wheel as shown below in the image.

An ambient light on the left side followed by a single vibration would notify of a single driver honking behind from the left side. Two ambient light on the left side followed by two vibrations would notify of two drivers honking from behind and so on.

Same applies with the right side of the steering wheel. The max no of indicators present on board would only be 3:3 each. In case of the sound produced by horn the vibrator and the ambient light together does the work of alert made by the sound for notifying drivers.



An ambient light on center top of steering wheel indicates that another driver is honking from the front side, in opposite direction, and a low intensity sound will alert the driver about the vehicle coming from the opposite side. This can be useful in situations where vehicle is taking turn and driver wants to notify other drivers about his/her presence. The receivers placed on the both side of the vehicle would detect the signals direction according to which the vibrator would vibrate and the ambient light would glow up. Using this approach we can thus overcome a certain level of noise pollution made by the un-necessary honking of vehicles.

3. CONCLUSIONS

Humans for years have now been accustomed to use horns making sound to notify or alert drivers while driving but by going the soundless way slowly by slowly noise pollution can be controlled. Since lately humans have been more concerned for saving fossil fuels and switching to an eco-friendlier way to use an alternative for day today use a step must also be taken to tackle the overgrowing problem of noise pollution that has grown tremendously over the ages and humans in only way can contribute to stop noise pollution by slowly switching to an alternative that reduces the risk of noise pollution.

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