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Noise Pollution Reduction through Sensors and Digital Image Processing

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ABSTRACT

Noise pollution is one of the major concerns in today's scenario. And one of the major contributors in noise pollution is honking by vehicles. Therefore we are intended to use some sensors and some hardware to reduce the effect of vehicular horns. Here only the intended drivers will get alert while rest of the area will remain undisturbed. We will be using radio waves for transmitting signal and this signal will be send only to intended receiver, receiver will be identified by its unique number plate. To identify the number plate we will be using some digital image processing techniques. The signals will be send by the sender by radio frequency transmitter to the receiver having id same as the number plate. Once the receiver got the signal then two actions will be performed simultaneously. One is horn will be blown inside the car only and the other is the tail light will be blinked to alert the sender that the receiver has heard the horn. Otherwise the sender has the option to use the normal horn.

Keywords: radio frequency, transmitter, receiver, signals, noise.

I. INTRODUCTION

Over In recent year's horns is a major contributor to noise pollution in Indian cities. Experts have warned that chronic exposure to sound beyond 93dB for eight hours can cause irreversible hearing loss. The road transport and highway ministry is considering a proposal to reduce themaximum permissible decibel range of vehicle horns, a move aimed at curbing noise pollution from compulsive honking on Indian roads. [3]

Honking for no reason makes irritation and Researchers says that noise pollution may increase the risk of heart disease, such as coronary artery disease, hypertension and heart failure.

We are applying DIP because the vehicles which we are considering is a moving objects so while scanning the number plate there are chances that the image which we are getting might contain some noise so to remove those noise image processing algorithm are required.

Once we got a clear picture of the number plate we will be sending the signals to the vehicle of that number plate and when that vehicle will receive the signals the horn will be blown inside that vehicle only. And once the horn got blown we can blink the tail light of the vehicles so that sender will get alert that receiver has received the signals and if there is no signals of reception then the sender has the option of using secondary horn(usual horn) that will alert the whole region within the frequency range of the horn.

II. SURVEY

According to the Environment Protection Act, the noise limit prescribed for automobiles is 85dB (decibel).That means increase of 10dB will makes a sound that is perceived to be twice as loud.

According to a survey conducted by Awaaz Foundation in Mumbai, vehicles have been observed to honk at peak levels of up to 108.4dB.

"Honking is a major source of sound pollution and each year around 1.5 crore vehicles are added. If the standards for horns are fixed around 90dB and immediately implemented on new vehicles and in a time-bound manner on older vehicles, the noise pollution due to horns will reduced by 1/6th provided the much-needed relief to people," said Nevatia.

In its recommendations, Deole said, the MPCB suggested to restrict the sound levels for horns at 88dB, while the CPCB felt the sound level for horns should be 95dB. "We will wait for the CPCB to fix the standards and immediately work on0 fixing standards for the state as well," he added. [Indian express]..

III. LITERATURE SURVEY

There are several methods to control the honking such as:

A. Through VANET

The In VANET network each and every vehicle behave like node or a router so that they can communicate with each other. Instead of alerting the whole area in this network the vehicles can communicate with each other over the range of 100-200 m and only the intended vehicles will be alerted. But implementing such system in such a large country will be costly enough and also this method is not efficient for those areas in which this network is not available. [1]

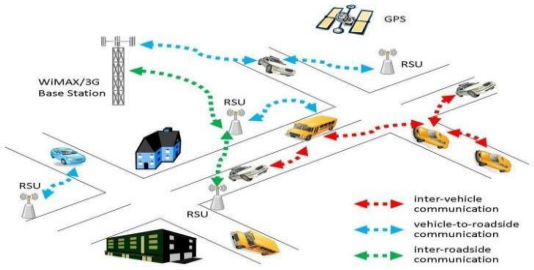

Figure 1. VANET

B. Using Infrared rays

Instead of using VANET if we use infrared waves then this method will be cheap to implement because for emitting infrared waves IR led can be used and for reception purpose IR receivers can be deployed the same transmitter and receiver which is generally found in TV and TV remotes. But if we use this method then the range of horn gets decreased and the sender will not be able to alert the person 50-60 m away from him/her. And the second disadvantage of using this method is infrared ray wave's works on line of sight which means the receiver has to be in straight line and should be sync with transmitter. [6]

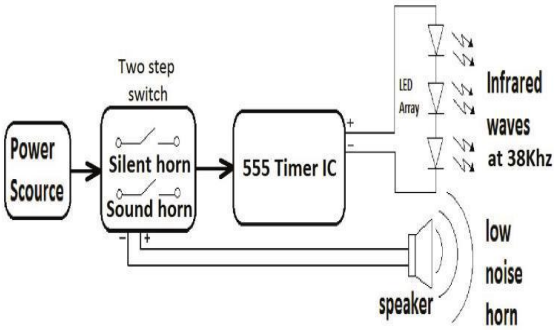

Figure 2. Transmitter block diagram

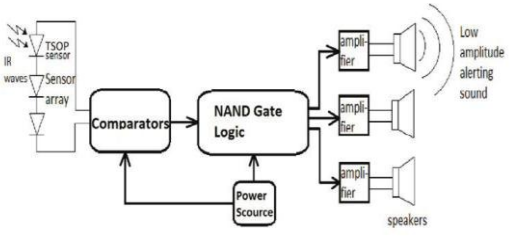

Figure 3. Receiver block diagram

C. Using Bluetooth

By using Bluetooth transmitter and receiver two vehicles can communicate with each other by sending the signal over Bluetooth. The advantage of

using this methodology is it is cheap to implement. But it has its limitation as well, the limited range of Bluetooth makes it useful over short distance but it will not be as useful over large distance such as on highways. [5]

D. Using GPS system

The other alternative is using GPS system to locate the vehicle and sending the signals to the receiver. The at receiver side intensity of the signal gets compared is it is greater than the threshold value then the receiver gets notified and it works accordingly. The main drawback of this system is that when it's come to practical implementation it is quite costly. [5]

IV. ROPOSED METHODOLOGY

Number plate identification and Storing

We will be using digital image processing techniques to identify the number plates uniquely. The number plate will be scanned by the camera installed in front part of the car and since the image acquired by the camera will have noise in it so it will be difficult to identify the numbers uniquely so to remove noise and to identify the numbers image processing is needed. This will include detecting the vehicle and in vehicle we have to identify the required area i.e., number plate after which noise from image acquired through camera will be removed and the numbers in number plate will be identified.

So in wholesome this process will include detecting the vehicle and then capturing the vehicle image. Vehicle number plate region will be extracted using the image segmentation in an image. After which the characters will be recognized by optical character recognition techniques. After reconditioning the numbers this number have to be stored temporary in some place from where retrieval is as fast as possible.

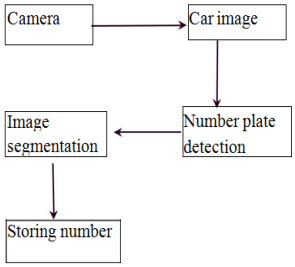

Fig.4 Number detection process

Transmitter Process

Once the transmitter got the numbers form the storage system it will treat that number as the pseudo code. Here the role of transmitter is to combine both the signal and the number and to send this combined code to receiver.

Transmitter contains three blocks

1) Encoder
2) Modulator
3) Storage system

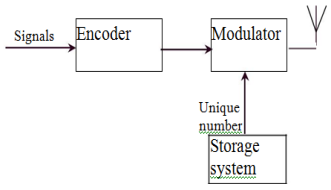

Fig.5 Transmitter Process

Receiver Process

Receiver storage system has predefined value which is same as the number on number plate. So whenever the receiver will receive the signal from the transmitter which contains the signal with pseudo code, then the first thing the receiver will do is to compare the pseudo code with its number and if matched then it will alert the driver about the signal.

Receiver process also include three blocks:

1. De-modulator
2. Decoder
3. Storage system

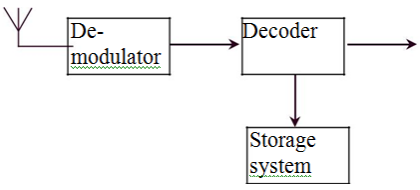

Fig.6 Receiver Process

Alert

When the match occurs the driver on receiver side should get alert of the vehicle behind him so that he/she can take appropriate actions. Not only the driver on receiver side will get alert but also the sender will get alert that the driver on receiver side has received the signal.

The sender can be alerted by blinking of tail light of the receiver side vehicle.

Alternative

If the sender does not get alert back by receiver then he/she has the option of using the secondary horn (usual horn).

ADVANTAGES

This method will be cheap to implement as well as the transmission range of the signal got improved to certain extent.

DISADVANTAGES

Vehicles should be in the range of the camera.
Costly as the processor with good computational speed is required.

V. CONCLUSION

We have successfully implemented this project and we found that the range of this method is better than the infrared rays but it has the limitation that vehicle should be in the range of the camera.

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