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REAL-TIME MULTI-CHANNEL V2V COMMUNICATION BACED ON SAFE DRIVING

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Abstract— **The number of road accidents has been increasing every year, resulting in a significant loss of life and property. The lack of advanced safety measures in vehicles and irresponsible driving behavior like drunk driving are the major causes of these accidents. The demand for a reliable and efficient safety system that can prevent road accidents and reduce the number of fatalities is increasing. There is a need for a system that can detect collisions and drunk driving and send alerts to the concerned authorities in real-time with minimum delay. Currently, there are some existing safety systems that can detect collisions and perform alcohol detection at vehicle start, but they do not provide a comprehensive solution to the problem. The proposed safety system utilizes advanced sensor technologies such as crash sensors, acceleration sensors, vibration sensors, alcohol sensors, IR sensor, GPS and GSM modules. The proposed safety technique integrates Vehicle-to-Vehicle (V2V) communication and has a basic automated parking feature, which can park the vehicle safely if the driver is detected to be under the influence of alcohol. The automatic parking feature enables the vehicle to slow down along with automatic turning ON of the parking indicator and also steering the vehicle towards the sideways of the road for parking. The system can detect collisions and drunk driving in real-time and send alerts to the concerned authorities in the form of a URL which denotes the exact location. The vehicle to vehicle (V2V) communication feature ensures that other vehicles on the road are informed of the drunk driving situation, thereby reducing the risk of further accidents using IOT. The proposed safety system can significantly reduce the number of accidents caused by collisions and drunk driving, ultimately leading to a reduction in the loss of life and property.**

Keywords—**Global Positioning System, Vehicle to Vehicle Communication**

I.INTRODUCTION

One of the objectives common to almost all transportation systems is the minimization of accidents by all means. Since the invention of automobiles, researchers are trying to increase the safety of roads. That is usually done by improving the geometry and the physical layout of the roadway. For example smoothing curves in roads and increasing stopping sight distance can make roads safer to use. On the other hand, several advanced safety features were added to automobiles, such as airbags, and anti- lock brakes. Recent advances in information technology and telecommunications; has introduced Intelligent Transportation Systems (ITS) as another important solution to road safety problems. Vehicle-2-Vehicle (V2V) wireless communications systems have attracted more interest due to their improved efficiency and reliability. The increase in demand for safer transportation made traffic telemetric applications undergo intense research and development. To reduce injuries and fatalities because of car accidents, vehicle safety needs to be more than the traditional passive safety technologies such as airbags and seatbelts. The vision for automotive safety applications is that all vehicles are equipped with sensors that are used to gather road andtraffic.
Conditions and share this data with other vehicles around them. Each vehicle can receive and process information from the data collected from other vehicles to improve its braking system timing, enhance airbag functionality and reduce fuel consumption and travel time. In order for these vehicles to share this kind of data they need to create an ad-hoc network, which requires a reliable low-latency V2V communication links capable of meeting strict delay and error rates. This kind of applications and services require fast and efficient V2V wireless communication, at data rates between 1 and 10 Mb/s. Such V2V communication systems require accurate models for the V2V propagation channel.

The main challenge in the development of the V2V is the temporal variability and inherent non stationary of the wireless channels involved, which affect data packet transmission reliability and latency. Dedicated Short Range Communication (DSRC), is an international standard dedicated in part to the Wireless Access in Vehicular Environments (WAVE) initiative. The new standard is based on the IEEE 802.11a standard, it is intended for both V2V .

Problem Statement

This thesis evaluates the suitability of the DSRC communication systems in term of meeting the requirements of the safety applications mentioned in the previous section. In order to test the reliability of DSRC, multiple factors have been included in the model and were tested. They are:The maximum distance between the transmitter and the receiver within which reliable communications can be maintained.Different test environments, such as, highway, rural, suburban, and urban, which are characterized by different propagation environments.

Existing System

In existing technology of V2V communication there is no NRF communication between vehicles. Existing technology is time consuming

There is no combination of alerts in previous technology like audio, LED and LCD display.

Disadvantage

Too much time take to identified problem.

II.PROPOSED SYSTEM

The primary goal of this effort is to lower the number of fatalities brought on by auto accidents and also the most important factor for the dangerous problem facing society. Various factors involved in car collisions such as drunk driving. In this work, the post-accident safety, information system and autonomous system is what we suggest. As is common knowledge, when an accident occurs, the injured victim may not be able to call for help, and due to improper care, it is also possible that the person may have to lose their life. Consuming alcohol during driving can seed serious accidents for various reasons and sometimes death since many drivers can't control the vehicles. This technique is extremely beneficial in this type of emergency to preserve lives, receive medical care quickly and prevent tragic accidents.

BLOCK DIAGRAM

TRANSMITTER

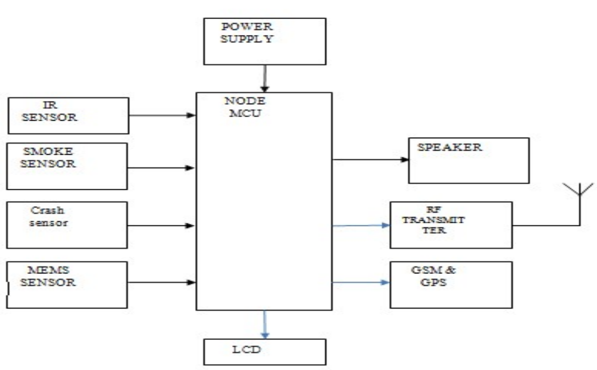

Fig.1 Transmitter

RECEIVER

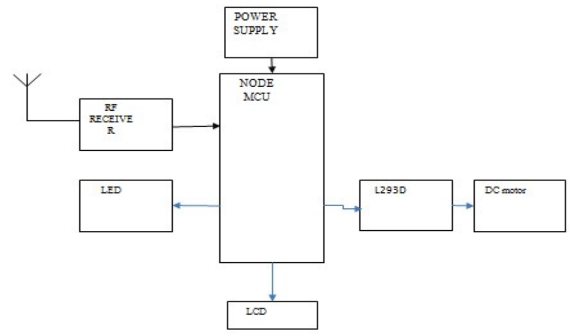

Fig.2 Receiver

III.METHODOLOGY

This chapter describes the parts of DSRC standards that apply to our work. Specifically, we introduce and explain the IEEE-1609 set of standards for Wireless Access for Vehicular Environment (WAVE) and the IEEE-802.11p. The IEEE-802.11p protocol is similar to the well known Distributed Coordination Function (DCF) MAC protocol for IEEE802.11a/b/g.some of the issues that need to be addressed include prioritized access, unpredictable response and reliability.

The physical layer of IEEE-802.11p is identical to that of IEEE-802.11a. There-fore, it uses OFDM with adaptive coding and modulation as indicated. The MAC layer of 802.Ilp is based on DCF, which is common in all802.11.TheEDCA (Enhanced Distributed Channel Access) provides MAC extensions,which allow for priorities and lower access delay. The concepts of Access Category (AC)and Arbitrary Inter-Frame Space (AIFS) provide the mechanisms for service differentiation. The basic communication parameters of DSRC standards vary in different parts of the world. In our work we adopt the standards in North America. The main parameters include, the frequency bands.

IV.SCENARIOS AND SERVICES

In the technical report that was issued in 2005 by the National Highway Traffic Safety Administration (NHTSA) and U.S. Department of Transportation (USDOT), some requirements for intelligent vehicle safety applications using DSRC were stated. The definitions of requirements for several safety applications are:Transmission Mode: describes whether the transmission event-driven or it is periodic.Minimum Frequency: which is the information update rate in(Hz).tate some of these requirements for various types of safety applications.We focus on a critical safety mode. The basic idea is that, when a car detects a critical situation such as; an accident, a dangerous slippery section, the sensors in the car would generate an urgent alert message and transmits it to the cars behind it. The most critical parameter is the delay. Each car approaching the detected "event" must receive the message within a Maximum Tolerable Delay (MTD). The MTD is calculated such that the driver would have enough time to react to the event and stop the car. An example of this application is the avoidance of pile-ups. When two cars collide and the vision is not clear, the incoming cars could be alerted in order to avoid multiple collisions (a pile-up). This can be accomplished by sending critical safety message.We make the following assumptions:The cars are travelling in both directions.Urgent safety messages are transmitted on a dedicated channel which remains idle most of the time and is accessed only under certain conditionsNon-urgent safety messages including information messages compete for access on a separate channel or channels.Car sensors will determine if the message is urgent or not, and there is a list of specificconditions that trigger an urgent mode.Obviously, the level of criticality of the message decreases when an incoming car is too far away from the location of the "event". This will reduce the need or urgent multi-hop message relay. We still need message relay to pass the information to cars further away from the accident location but we should not allow the relay mode to interfere with the urgent safety message.unnecessary message relay. For example, a car too close to the accident location should not relay the message because it can interfere with a repeat of the original message. Only cars further away from the accident location would be allowed to relaythe message.We assume that there are restrictions on the message relaying. The most important restriction is to give the original urgent message and its possible repeat priority over the relaying. This can be implemented by putting the two messages in different classes with two different AIFS or alternatively, we can classify the relayed message as ”safety message' but not an ”urgent safety message“ . In such case, relayed messages could be broadcast on a separate channel.

In DSRC there are 8 channels, one channel is used for contI 1, one for safety messages, one for urgent messages and the remaining 5 channels are used for non-safety applications. The process is triggered when an urgent event (accident) is detected, the vehicle that is in the accident sends a high.

EVALUATING THE DSRC

As was mentioned in the previous CHAPTER, this research is aimed at determining the reliability of DSRC for V2V communications. The reliability was tested by changing multiple factors, such as, distance, speed, and test area. Four test environments have been considered in the course of this research, which are, highway, suburban, rural, and urban environments. For each test area, several pertinent parameters, explained in table , have been used. Some values have been common to all tests including: transmit power (20 dBm), receiver speed (25, 50 km/h), source speed (0 km/h), and a reference distance (100m 32)). This section explains various simulated tests for various environments.

DEVELOPED SNR/DOPPLER

This section explains the model that has been developed and used in this thesis to generate SNR and Doppler shift values to be applied by the IEEE 802.11a model that was explained earlier. The main reason for the SNR/Doppler Shift Generator model is to study the effect of distance, speed and environment on the reliability of the DSRC wireless communication channel. Calculating SNR values at different distances between transmitter and receiver tests the change in distance factor. In order to generate the SNR values we need to calculate the transmitted power using equation, which is in dBm, then calculating the received power using equation , which is done by subtracting the Free Space Path Loss (FSPL), which was calculated using equation , from the transmitted power. The transmitted power and received power are constant for a certain transmitted power.

ADVANTAGES

- People's drives will be more convenient and comfortable .
- Accidents will be extremely rare.
- Any issue that someone encounters while driving will be communicated to others .
- Quick response time
- Highly flexible.

APPLICATIONS

- It is used in person safety
- Hard Braking Ahead warning.
- Control Loss warning.
- Intersection collision warning.
- Adaptive Lighting.
- Co-operative Lane changing.
- High speed Vehicle approach warning.

V.CONCLUSION

India's Motor Vehicles Act lagging far behind the needs of a fast-motorizing society is painfully evident from its road safety record. In a country witnessing 10% annual growth in vehicles, and boasting a network of 3.3 million km of roads, the Bill for creation of a statutory National Road Safety and Traffic Management Board must be speeded up. Such an agency is vital to set standards for road design, inspect existing roads, and investigate accidents scientifically.

- It should take a "zero tolerance" policy toward the most common transgressions—dangerous and reckless driving; disregard for traffic rules; jumping red lights; driving under the influence of liquor; failing to use seatbelts; and driving without a helmet—to bring about a visible change.
- But strict implementation of traffic rules and stringent punishments alone will not solve the persisting crisis. Change in the mind set of riders and drivers and road users realizing their responsibilities alone will bring about a change.
- Most countries have a multidisciplinary approach to traffic planning and road design. It is done by psychologists, engineers, doctors, sociologists, vehicle experts, etc., In India, road traffic is still a civil engineering issue. Lessons can be learnt from the eminent guidelines and good practices for good behavior on the roads practiced in developed countries where safety, orderliness, and discipline are ingrained in the citizens, come what may. Mere celebration of the annual Road Safety Week during the first week of January does not serve any purpose. Drivers should learn to show consideration and respect to co-vehicle drivers and pedestrians so that our roads become safer. But it looks a long way to go.

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