Automatic Vehicle Speed Control System Using Zigbee Technology

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ABSTRACT
Intelligent instruments are used in every part of our lives. It won’t take much time to realize that most of our tasks are being done by Electronics. They will perform one of the most complicated tasks that a person does in a day, that of driving a vehicle. As the days of manned driving are getting extremely numbered, so are those of traffic jams, dangerous and rough drivers and more importantly, accidents. According to Mr Willie D. Jones in the IEEE SPECTRUM magazine (September 2012), a person dies in a car crash every second. Automation of the driving control of vehicles is one of the most vital needs of the hour. This technology can very well implement what was absent before, controlled lane driving. The ultimate aim of this project is to automatically control the speed of the vehicles at speed restricted areas such as school and hospital zone etc. This project is mainly developed to avoid accidents due to high speed vehicles and also to enable the public to cross the road without any danger from high speed vehicles. Usually the drivers drive the vehicles at high speed without considering the public in speed limited areas too. Even though the traffic police control them we cannot achieve full response from them. Also it is not possible to monitor those areas at all time to regulate their speed. Thus this project paves way for controlling the speed of the vehicles within certain limit in those restricted zones without the interruption of the drivers. Here we use Zigbee transreceiver communication method for controlling purpose. In order to implement this in public then we want to attach the Zigbee receiver along with the vehicle and the Zigbee Transmitter with these Zones.

Keywords--LCD, over-speed management, PCF8591 IC, MAX232 IC, P89V51RD2 IC, L293D IC, Traffic rules, ZigBee.

I. INTRODUCTION
It is known that road accidents are increasing day by day. Most of these road accidents are caused because the automobiles are driven at high speeds even in the places where sharp turnings and junctions exist. Running the automobiles even at those places is the main cause for the accidents. Reduction of number of such accidents is the prime step needed to be taken. Intelligent speed adaptation uses information about the road on which the vehicle travels to make decisions about what the correct speed should be. This information can be obtained through use of a incorporating roadway coordinates through general speed zoning information for a defined geographical area (e.g., an urban area which has a single defined speed limit), or through feature recognition technology that detects and interprets speed limit signage. ISA systems are designed to detect and alert a driver when a vehicle has entered a new speed zone, when variable speed zones are in force (e.g., variable speed limits in school zones that apply at certain times of the day and only on certain days), and when temporary speed zones are imposed (such as speed limit changes in adverse weather or during traffic congestion, at accident scenes, or near roadwork’s). The purpose of ISA is to assist the driver in keeping to the lawful speed limit at all times, particularly as they pass through different speed ‘zones’. This is particularly useful when drivers are in unfamiliar areas or when they pass through areas where variable speed limits are used.

Previous established automation systems:
Many systems have been developed to prevent these road accidents. One of them is Cruise control system (CC) that is capable of maintaining speed defined by the driver and its later evolution version Adaptive Cruise Control (ACC) that keeps the automobile at safer distance from the preceding vehicle. But these systems have no capability to detect the curved roads where the speeds of the automobiles have to be lowered to avoid the accidents. Later curve warning systems (CWS) have been developed to detect the curved roads by using Global Positioning System (GPS) and the digital maps obtained from the Geographical Information Systems (GIS) to assess threat levels for driver if approaching the curved road quickly. But these maps need to be updated regularly and are not useful if there are unexpected road diversions or extensions etc. Here we propose a dynamic model where the system controls the speed of the automobile according to the data in
the frame that is transmitted by the Zigbee transmitter fixed to the nearby poles.

II. MOTIVATION FOR ZIGBEE

The ZigBee standard was developed to address the following needs:

- Low cost
- Secure
- Reliable
- Flexible and extendable
- Low power consumption
- Easy and inexpensive to deploy
- Global with use of unlicensed radio bands
- Integrated intelligence for network set-up and message routing.

A. Key features of our design includes:

1. The Zigbee transmitter sends the speed limit of the particular lane, present speed of vehicle is compared with the speed limit, and if it’s exceeded then it should be controlled by the user.
2. If it’s not controlled manually then this system itself will control over speeded vehicle automatically.

III. BLOCK DIAGRAM:

The block diagram and its description are shown in Figure It has two sections:

A. Transmitting Unit: - The Transmitting unit consists of a PC as server interfaced to zigbee which will continuously transmit the information according to the zone. It will also maintain the data like vehicle number, entry and exit time of vehicle etc. The transmitting range will be set about 100 meters to 0.5 kilometre in radius or as per the zone’s requirement.

B. Vehicle Speed Control and Monitoring Unit:

In this unit, the moment at which the vehicle receives the signal, the control action takes place, which will control the position of the throttle valve by limiting the maximum speed of the vehicle. And also the display which will be present inside the vehicle will display the name of the respective zone within which the vehicle is present.

IV. METHODOLOGY:

We can explain the working of our system in 3 modes depending on zones.

A. NORMAL ZONE:

When the vehicle is running in normal zone, speed of vehicle will vary according to the input given by pot. The pot is connected to ADC which is interfaced with microcontroller. Microcontroller will give the signal to motor according to the output of ADC. Motor is winded with accelerator cable which will rotate according to the microcontroller output and speed will vary accordingly.

B. SILENCE ZONE:

Now consider the case when the vehicle enters in silence zone, the controller will receive the signal from zigbee about the zone and will accordingly give the signal to relay driver IC to disable the horn of the vehicle.
C. SPEED LIMIT ZONE:
When vehicle enters the speed limit zone, controller will receive the transmitted signal from zigbee about the zone and limiting speed of the zone. Present speed of vehicle is compared with the speed limit, and if it’s exceeded then it should be controlled by the user. If it’s not controlled manually then this system itself will control over speeded vehicle automatically by rotating the motor in reverse direction till the vehicle speed is in the limit. In the limited zone user can't increase the speed of vehicle above the limit but can change the speed below the limit.

V. RECEIVER IMPLEMENTATION

A. Receiver kit :

Fig 7: Kit mounted on vehicle.

B. Modification of vehicle:

Fig8: Interfacing of motor with accelerator wire of vehicle.

VI. APPLICATION
1. This implementation will be very useful for traffic personnel to regulate the speed.
2. It will also disable the horn near school and hospitals.
3. Comparing earlier implementations, this is a low cost method which is practically feasible.

VII. FUTURE WORK
At present, we have excluded geared two wheelers from the scope of this project because it complicates the control mechanism. In future the work can be applied to geared two-wheelers and four-wheelers.

VIII. CONCLUSION
This project is designed to solve the problem of over speeding of vehicles due to bad driving behaviour near speed limit zones, hospitals, schools or any private sectors. This device compares the speed of vehicle with speed limit zone and automatically adjust the speed according to the limit. It will also help to disable the horn in silence zones with additional feature of maintaining database of vehicles at the server side. Thus it will ultimately help us to improve bad driving behaviour of driver, Traffic management, road safety, violation management. Wireless transmission is achieved with the help of zigbee, which provides low cost transmission of data.

REFERENCES

