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A New Zonal Based Vehicle Speed Control System

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Abstract: In this paper a new zonal based vehicle speed control system was presented. In conventional system the speed of the vehicle is controlled and it is same everywhere. However, it is not acceptable to maintain the same speed of the vehicle in sensitive and normal areas, respectively. Hence to overcome this problem I propose a new zonal based vehicle speed control system. The main objective of the proposed system is to fix the maximum speed of the vehicle in different zones. In this work the roads are divided in to 4 zones. They are schools, hospitals, hill areas and highways. The developed embedded system contains a transmitter and a receiver, where the transmitter is placed in a base station to send the signal to all the vehicles in that zone and a receiver is placed in a vehicle to receive the signal and fix the maximum speed. The developed system was tested with the help of a prototype for different cases and the accuracy is almost 99%.

I. INTRODUCTION

Due to the advances in the technology, the average speeds of the vehicles are increased in the 21st century. Recent times the human beings are driving the vehicles with high speed even in limited speed areas due to which accidents are occurring recurrently. According to Global status report on road safety 2015, the total number of road traffic deaths has reported at 1.25 million per year worldwide, with maximum road accident rates in low-income countries [1, 2]. They also reported that these accidents are happening due to drunk and drive, over speed, without wearing motorcycle helmets or child restraints. Above all, driving the vehicles with over speed is the primary reason for this huge number of accidents. Usually, in order to avoid accidents due to over speed and to alert the drivers in speed limited places, the highway department used to place signboards. But most of the time people will not follow the speed limit which was mentioned in the signboards. Hence, to control the maximum speed of the vehicle automatically we developed a system which intimates the driver before entering in to the zones and the sets the maximum speed limit automatically using RF technology and ARM controller. Additionally, the proposed system contains a Display controller meant for vehicle's speed control and monitors the zones, which can run on an embedded system.

This paper begins by identifying three stages in the likely evolution of these advanced vehicle control systems (AVCS), showing how AVCS is related to the other IVHS functions. The technological elements of AVCS, corresponding to needed research and development work, are then described. The international state of the art in these technologies is reviewed, and the paper concludes with a discussion of an evolutionary progression that could be followed to lead from present-day driving to the long-term concept of an automated freeway network.

II. BLOCK DIAGRAM

Zonal based speed control vehicle model setup is divided into two sections. 1. Antenna/Transmitter section 2. Vehicle control setup section. Fig. 1 (a) shows the block diagram of antenna section which was used in the developed system. The antenna/transmitter section contains the following blocks such as RF module, encoder and data switches. Here 4 switches were considered and each switch represents each zone. When a switch is toggled then the respective zonal data is given as input to encoder. Encoded data is given to RF transmitter so it radiates the zonal speed limit through RF signals. Fig1 (b) is referring to the vehicle control setup section. This section contains the following blocks; they are ARM controller [3], RF receiver [4], Voice module, LCD display, vehicle control unit [5] and power supply. ARM controller is the main heart of the section which manages all the blocks of the section. RF receiver collects the RF signals and these are given to decoder to retrieve the data from the signal and output of decoder is given to ARM controller. ARM controller process the data taken form RF decoder and outputs are given to vehicle so that zonal speed is set to it and vehicle cannot exceed given speed as long as the vehicle stay and moves around the zone. By this means we can ensure the safety of people, things and controller over the vehicle can be established [6].

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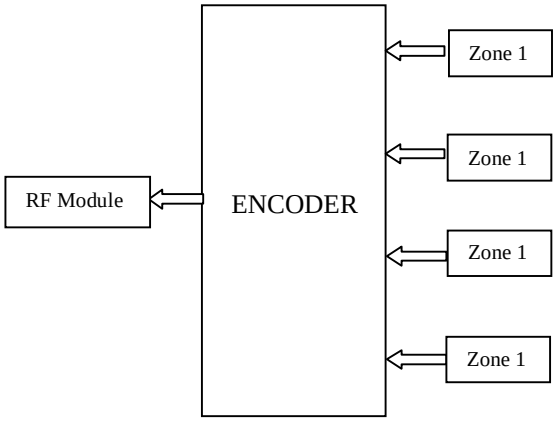

Fig. 1(a) Antenna Section

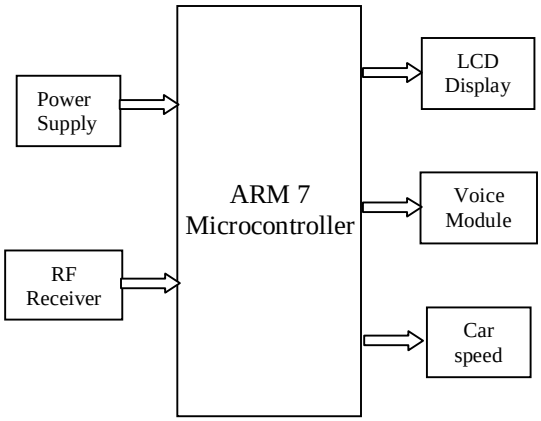

Fig. 1(b) Vehicle control setup section

III. EXPERIMENTAL SETUP

The experimental setup for the zonal based control vehicle is shown in Fig. 2. The following requirements for the experimental setup are adopter, care model with equipped with the control set, remote controller to manually run vehicle and transmitter. Adopter is used to provide the necessary power supply requirements to equipped vehicle. Equipment in the vehicle will get into zonal speed when it enters into any zonal speed. Remote control is used as a hand controller to drive the vehicle. Transmitter setup will radiate RF signals with carry respective zonal speed control data.

Fig 2 Experimental setup

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Figure 3 shows the working operation of model, here Transmitter radiating zonal speed limit. Vehicle which enters into its range of zone, automatically zonal speed will assign to the vehicle so that it cannot cross zonal speed limit. At the same moment the LCD display continuously shows up and audio output form voice module tell us speed limit and Zone name. As soon as out of range its limit is released so free to drive on own speed.

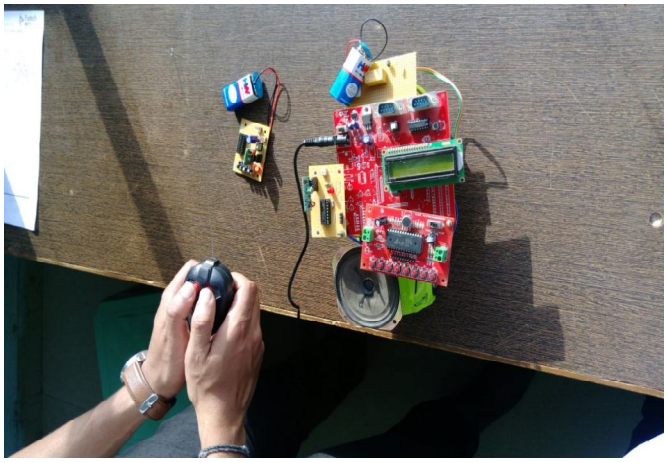

Fig 3 Working operation model

IV. RESULTS AND DISCUSSION

Zone1 is considered as a residential zone/Speed breaker zone. When the vehicle comes into respective zone then the controller recognize the signals from Tower/Transmitter and it sets the zonal speed limit to the vehicle and at the same time the speed is displayed and the voice module tells us its zone speed limit and in which zone vehicle currently is in. Figure 4 shows the vehicle is in Speed break zone and its speed Limit.

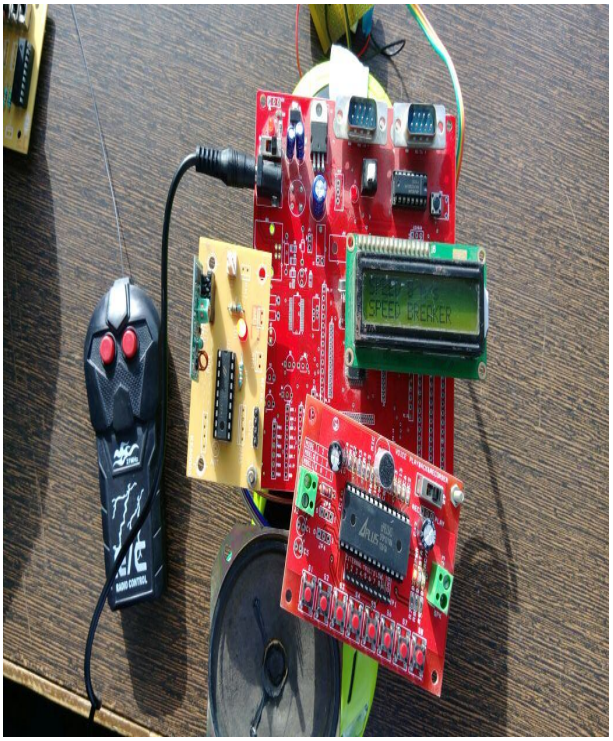

Fig.4 Zone1

Further different Zones are considered to limit the speed such as school zone, hospital zone and hilly areas. Figure 5,6 and 7 show different Zones.

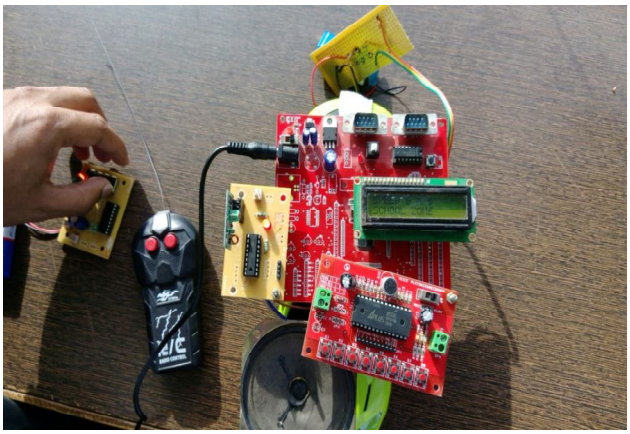

Fig. 5 Zone2

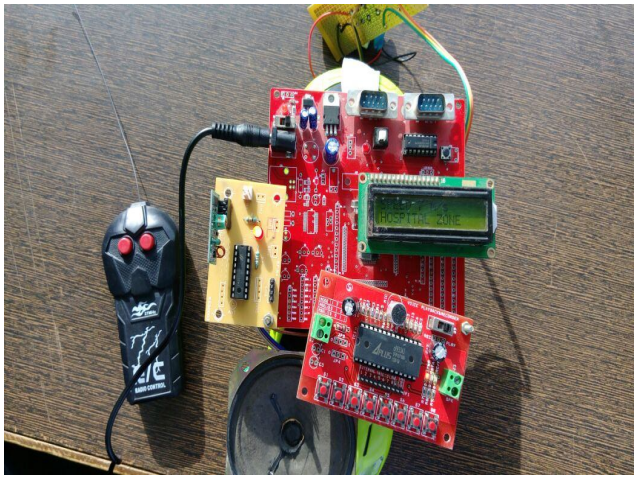

Fig. 6 Zone 3

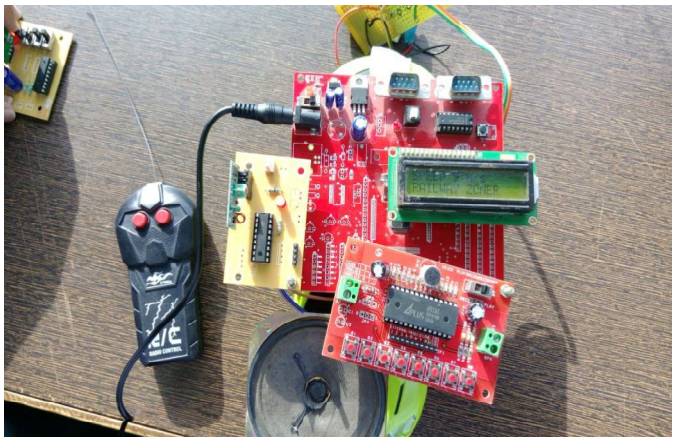

Fig. 7 Zone 4

V. CONCLUSION

In this work a zonal based vehicle speed control is presented. It is very easy to implement on current system, low value and sturdy, ensures most safety to passengers and public. The developed kit is identifying the respective zones and maintaining their maximum speed successfully. The information of the zone to the driver is intimating though display and voice. The accuracy of this work can be further improved by using google maps to link and identify different zones.

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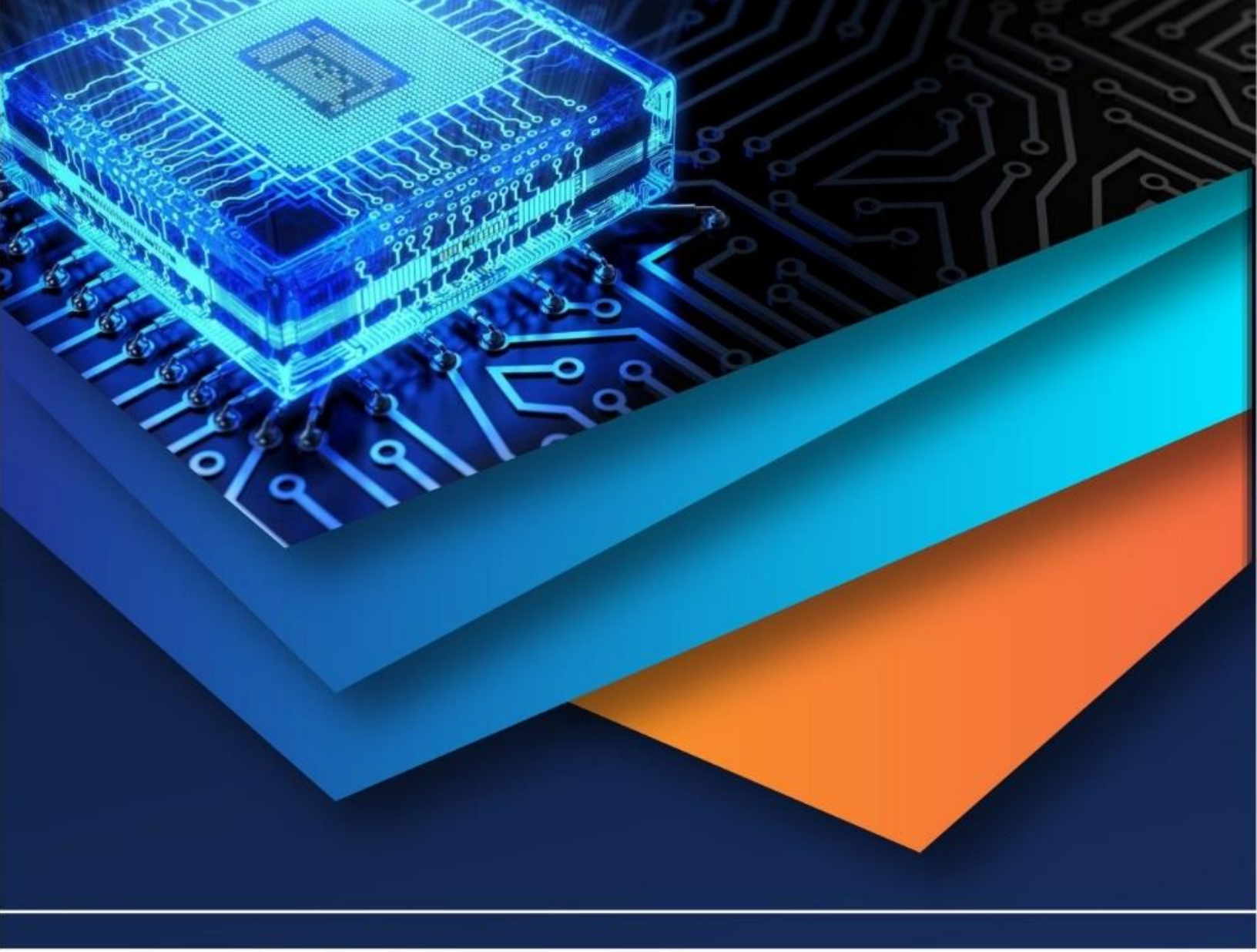

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