ISSN: 2278 – 909X
International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE)
Volume 7, Issue 6, June 2018

Android Based Vehicle Speed Control System In Critical Zones Using GPS Technology

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Abstract: **At present, people used to drive vehicle very fast and thus there is a chance for the occurrence of accidents. It leads to miss their valuable life by making small mistake while driving in critical zones such as schools, colleges, hospitals etc.. Road safety is a great question mark for public, especially in critical zones. Even though speed breakers and warning alerts are provided, many people do not have passion to follow the traffic rules. Most of the road accidents are happened due to the carelessness of the drivers which leads to loss of many life's of people.3931deaths due to accidents were registered in Tamil Nadu in the year 2014.The traffic police are not able to control them completely and also it is not practical to monitor all critical areas throughout. At present different types of vehicle speed limiters are in use for regulating the speed especially in the roads near critical areas. However ,the current statistics show that there is very high rate of accidents registered in these critical areas.**

Many systems are presently exists to manage this problem. The existing systems are based on speed cameras, RF transmitter and receiver, warning system, speed limitation devices etc. However, these techniques are not effective and accidents are occurring very often. By using Speed cameras, high speed vehicles are only monitored but, it cannot slow down the speed of the vehicle and thus it will not reduce the number of accidents. RF transmitter and receiver has a potential disadvantage, of interference between the signals when more than one signal arises. Initial costs for RF devices are high as many RF devices are to be installed for every critical zones and areas.

To overcome this problem an automatic speed limiting system in the critical zones is essentially required to reduce accidents. To address this essential requirement, an android application has been developed with GPS technology in order to identify the critical location and control its speed of vehicles automatically. When the vehicle reaches a critical zone, the GPS device transmits the signal to the controller through Bluetooth. The mechanism associated with the engine automatically reduces the speed of the vehicle and displays the name of the critical zone in front of driver.

The proposed technique has been designed, constructed and in corporate in a two wheeler and tested with many critical zones exist in Erode district, Tamilnadu. The proposed system reduces the speed and maintains it between 20 km/hr and 30 km/hr speed at critical zones.

***Keywords*-Android application, GPS, GSM, Breaking System.**

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I. INTRODUCTION

The environment, creating an advisory to limit the maximum running speed of the vehicle at critical zones is presented.According to the survey of theNational Crime Records Bureau, Ministry of Road Transport and Highway, Law commission of India and Global status report on road safety, one serious road accident in the country occurs every minute and the road happen for every hourroad crashes occur every day in India. Two wheelers account 25% of the total road bang and nearly 20 children under the age of 14 die every day due to road crashes in the country.The traffic police cannot able to control them full effect. Also,it is not practical to monitor these areas throughout. Different types of vehicle speed limiters are currently in use for regulating the traffic, especially across roads near populated areas such as hospitals, schools and colleges[1].

This project provides an effective solution to the problem discussed above by creating an on board speed regulationmodule for vehicles which can observe as well as control theirdirect speed in comparison with the maximum permissible speed

ofthat location. The location is obtained GPS and GSM system. The matching algorithm is design and development in the on board designfor limiting vehicle's speed. The actual speed of the vehicle is continuously [2] compared with the Android application and the location based limitsobtained through the developer database is provided:

a) The advisory signal to the driver about the need for a reduction in speed.
b) An automatic reduction of the speed below the prescribed limits.

The proposed algorithm compares the actual speed with the data store in the database with the maximum speed limit of the corresponding zone periodically, the processing time depends on the execution time. The developed algorithm tracks the vehicle position using GPS and GSM receivers which leadto increased efficiency, reduced complexity and processing time in contrastto the conventional methods.

II. EXISTING WORK

Presently different types of vehicle speed limiters are in use for regulating traffic, especially across roads near populated areas such as hospitals, schools and colleges. There are many existing systems are coming over this problem. The existing systems are based on speed cameras, RF transmitter and receiver, alarm system or speed limitation devices.

Speed cameras in critical zoned areas only able to capture the high speed vehicle. It will not reduce the speed of the vehicle and thus it cannot reduce the accident [3]. The implementation of RF transmitter and receiver has some disadvantages such as when more number of vehicle crosses the RF devices the interference of signals creates problems. Initial Cost is also high as exclusive RF devices required for every critical zone and areas. RF devices are removable, and it can be removed by any other persons. The Speed of the vehicle does not reduce in the critical zones like colleges and school.

To overcome this problem a project aimed to implement an automatic speed limiting system in critical zone is presented. An Android application has been developed with the GPS based system in order to identify the location automatically. When the vehicle reaches the critical zone, the GPS device transmits the signal to the receiver hardware through Bluetooth.[5] The android device shows critical zone areas and indicates the notification to slow down the vehicle speed. When the vehicle reaches the particular zone, the GPS device transmits the signal to the receiver hardware by the Bluetooth. The mechanism associated with the system automatically reduced the speed of the vehicle.

This project presents a novel method by which vehicle speed is controlled automatically. The speed measurement and control is accomplished via microcontroller with the signals being received wirelessly from GPS. Apart from its implementation in human operated vehicles, the project can be used to control speed of autonomous cars. GPS technology does not suffer from the aforementioned setbacks. The GPS receiver makes use of the satellites and the infrastructure already in place and an extensive library of map information is available. Therefore, the project uses GPS receivers to alert the driver about excess speeds at a given location. The project highlights how the information can be used to communicate with the on-board controller of a given vehicle and also how the speed of its vehicle in controlled. Several output peripherals such as LCD display and LEDs are used to provide feedback to the driver.

III. LITERATURE SURVEY

This chapter deals with the survey of various papers that have contributed to the vehicle speed control system. Different types of vehicle speed limiters are in current use for regulating the traffic, especially across the roads near populated areas. The current statistics showing the high traffic death rates occurring in critical zones. The following survey gives the detailed review of the speed control systems for the vehicle.

Ankita Mishra, JyotiSolanki ,HarshalaBakshi, Priyanka Saxena, proposed "Design of RF based speed control system for vehicles"[2]. Currently people are driving very fast; accidents are occurring frequently, the valuable life is lost by making the mistake driving (school zone, hills area, and highways). So in order to avoid the accident send an alert message and to control their vehicle speed the highway department used the signboards. The signboards are used view which kind of accident takes place.These are used to intimate the criticalzones and the speed limit automatically, using RF technology. Smart Display controller meant for vehicle speed control design using embedded systemand monitors the zones. Smart Display & Control (SDC) can be custom designed to and place in the vehicle's dashboard, on the vehicle. The project is composed of two separate units: transmitter unit and receiver unit. (Speed display and control) unit. Once the information is received from the transmitter, the embedded system placed in the vehicle run automatically alerts the driver.

Leena Thomas etal (2014) proposed "Automatic Speed Control of Vehicles Using RFID"[6].This paper aims is to control the speed of the vehicles in the critical zones such as schools, hospital zones etc. Nowadays the drivers drive vehicles at high speed without considering the safety of the public. The traffic police are not able to control them. Also,it is not possible to monitor these areas throughout An RFID is used for this method. The RFID reader is placed in the vehicle and the RFID Tag with these Zones. These tags are programmed, when the reader receives the signal it send a data in proximity. Whenever the vehicles enter into these zones the receiver receives the signal and control the speed of the vehicle with the help of the micro controller unit.. The tags are placed at the beginning and the end of the regions for which the speed should be reduced.

Vinod Rao.S, etal (2009) presented "Smart Zone Based Vehicle Speed Control Using RF and Obstacle Detection and Accident Prevention"[9]. This paper presents smart zone based vehicle speed control using RF. The method is used to detect and prevent the accident system. Whenever the vehicle is within the zone, the vehicle speed is controlled, for every time the vehicle speed is decreased to some cut off and control the speed when it move in acriticalzone, and then the vehicle can get accelerated by it. Detects Obstacles and prevents Accidents by Stopping Vehicle.

IV. PROPOSED WORK

An Android application has been developed with the GPS based system in order to identify the location automatically, and sends the notification signal to slow down the vehicle speed. When the vehicle reaches the particular zone, the notification signal is transmitted to the receiver hardware by Bluetooth[15].

The embedded system will make use of an Atmega microcontroller connected to the mobile GPS receiver via Bluetooth module. If the vehicles entering the critical zones, the speed of the vehicle will automatically reduce by using the PWM signal generated from the microcontroller Atmega.

The overall block diagram is described in the Figure 1, the GPS signal is received from the satellite to the GPS module and the received signal is forwarded to the indicating device. The indication device is the device that is deployed with Android OS. The dedicated android application is developed to detect the critical zone area such as schools, colleges and hospitals.

The developed android application is interfaced with the Google map to show the accident prone areas. It detects the critical zone area and the detected notification signal in the indicating device is transmitted by Bluetooth dongle to the engine control section.

And also the indication device alerts the driver that they have reached the critical zone by generating the buzzer sound automatically.

The engine control section consists of Arduino microcontroller. From the indication device the detected information signal is transmitted to the Bluetooth module. Then the Bluetooth module sends the received signal to the microcontroller via RS232 cable

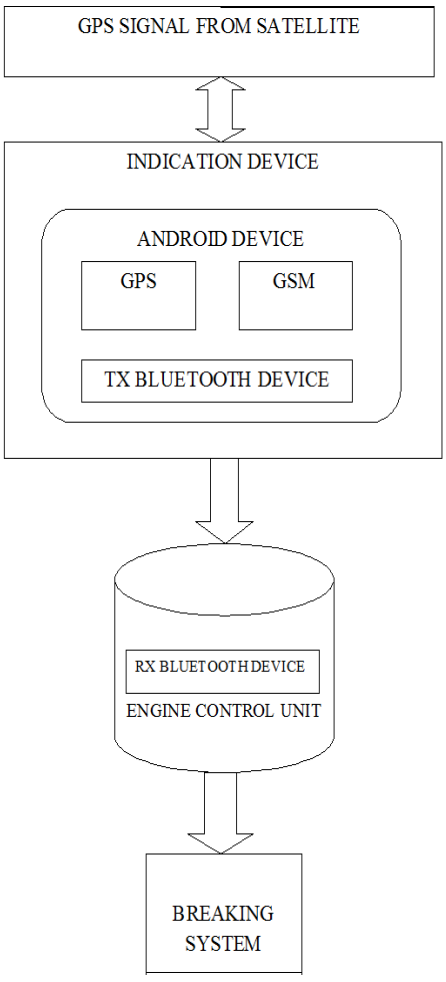

Figure 1 Methodology Used

The cable serially transmits the signal to the controller. The Arduino controller processes the information signal and the processed data is transmitted to the engine control section. With the help of receiving signal information the engine control section transmits the control over the breaking system and it will automatically reduce the speed of the vehicle in critical zoned areas.

V. RESULTS AND DISCUSSIONS

The android application is created by using android studio and programmed by Java script. The developed android application is used to find and locate the accident prone areas. The Figure 2 shows a login prompt for the purpose of security by providing username and password for authentication. If the username and password are correct, then it logged into the selection of zone areas check box.

Figure 2 Beginning page of android application

The Figure 3 shows the selection of zone areas in that it can able to select the accidental prone area. In the developed android application the critical zones are selected in the check box.

Figure 3 Selection of zone areas

The selected prone area with respect to the vehicle location are interfaced with google map to obtain the critical zone area in which the vehicle is near the critical zone area as shown in the Figure 4

In the figure 5 shows the output of the android application, if the vehicle reaches near the accident zone it automatically receive the notification message with the name of the particular school, college or Hospital's name to reduce the speed of the vehicle by the GPS module.

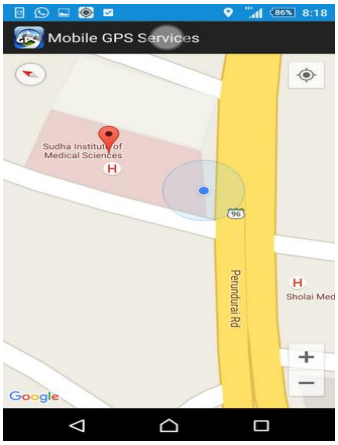

Figure 4 Google map services

And also it sends a notification message like "Go slow nearby: The Indian Public School" to the driver. Thus, this project concludes that it locates the critical zone area automatically and it alerts the driver by sending a warning message.

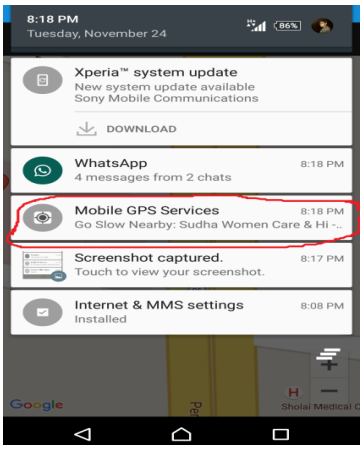

Figure 5 Received notification message

Figure 6 Real time implementation in a two wheeler

In Figure 6 shows the real time implementation of the proposed system in vehicle. When the vehicles reach critical zones, this system automatically controls the speed of vehicle. The speed limit at various critical zones like schools, colleges and hospitals is tabulated in Table 6.1. The speed of the vehicle is approximately within 30km in critical zones.

Table 1 Statistics of school and college zones

S.NO	CRITICAL ZONES	SPEED LIMIT
1	THE INDIAN PUBLIC SCHOOL	30
2	VELLALAR COLLEGE OF ENGINEERING AND TECHNOLOGY	26
3	A.E.T MATRIC HR SEC SCHOOL	30
4	KONGU ARTS AND SCIENCE COLLEGE	28
5	NANDHA CENTRAL SCHOOL AND ARTS AND SCIENCE COLLEGE	29
6	MAHARAJA COLLEGE BUS STOP	30
7	KONGU ENGINEERING COLLEGE	28

VI.CONCLUSION

India is the worst hit country in terms of the number of road accidents occurring annually and mostly they are caused due to over speeding of vehicles. There is an urgent need to put a system in place which can automatically restrict the top vehicle speed according to the speed limit regulation of a particular speed zone, thereby minimizing accidents due to over speeding. The system proposed is a fully functional automatic speed regulation system which is a step ahead of presently available speed controllers in terms of efficiency accuracy and simplicity.

The position matching andspeed limit subsequent extraction are the first type, which relying on both GSM and GPS input signals, complementing each other and thus avoiding the restrictions of using them individually for position tracking. A self assessment check is also done by the algorithm and in case of dispute, restricts itself from proceeding and starts processing with new inputs. It also has a special provision for limiting the speed in sensitive areas without affecting the speed limits of the complete speed zone in which the place of concern lies. If this system is made compulsory for all vehicles, a noticeable decrease in the number of road accidents would be seen and thus reducing a heavy loss of life and property in the country.

The proposed system has been incorporated with a two wheeler and tested in many critical zones of Erode district, Tamilnadu. The designed system has been working effectively and controls and maintains the speed from 26km/hr to 30km/hr.

In future, instead of slowing down the vehicles all the time, the system has to be enhanced using timer concept to slow down the vehicles only at peak hours. Also the Speed Control Driver (SCD) can be custom designed to fit into a vehicle's dashboard, and displays information on the vehicle. Once the information is received, it automatically alerts the driver and reduces the speed of the vehicle according to the time and zone.

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