Research Paper

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Automatic Speed Control in Restricted Areas

Engineering

KEYWORDS : LCD, PIC 16F877A microcontroller, Proximity Sensor, Relay, Ultrasonic Sensor, Zigbee.

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ABSTRACT

The proposed system automatically controls the speed of vehicles at speed restricted areas such as school and hospitals. The main reason behind developing this project is to avoid accident of vehicles at speed limit zones and also to help the passengers to cross the road safely without facing any danger from high speed vehicles. Normally, the vehicle drivers not consider the passengers who crosses road in speed limited areas and drive their vehicles at high speed. So, now accidents are increasing in these areas. The traffic police control the traffic but they are not able to avoid the accidents completely.. To solve this problem we developed the proposed system, which not interrupts the vehicle drivers and controls the speed of the vehicles up to certain limit in these speed restricted zones. The LCD displays the lane speed limit. Even though the traffic police controls them we cannot achieve full response from them. Also it is not possible to monitor those areas at all time to regulate their speed. This project is very useful for the common people to walk safely in the roads of speed restricted zones¬¬ and also drivers can ride their vehicles safely.

INTRODUCTION

In the present day scenario traffic rules are frequently violated by the drivers and over speeding occur due to bad driving behavior. So, a driver assistance system is provided to prevent over speeding, violation of road rules and also to display alert messages.

The proposed system has an alerting, recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limit of the particular lane entered by the vehicle and also gives alerts like "road works", "steep slopes", "school zone" in the form of acoustical messages and also in LCD. The receiver unit placed in the vehicle receives the messages and sends to the microcontroller.

When speed of the vehicle nears the speed limit it displays the warning and if exceeds the limit, the microcontroller records the violated speed and time. The LCD displays the lane speed limit. To Ensure decline in accidents and to improve road safety, speed control techniques such as speed control in school and college zones by using RF transceiver, automatic braking systems, Camera based detection, RFID technology based detection are implemented. The existing techniques still doesn't able to reduce the number of accidents. Hence in our system we are using ZIGBEE, which is low cost.

Proposed scheme

The system consists of a transmitter and a receiver. The transmitter module is fixed at pre-determined lanes/areas. Speed limit is pre-programmed in microcontroller. This information is transmitted as wireless signals through Zigbee because it uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world.

In determining the best driver and to evaluate his performance, factors taken into consideration are fuel consumption, reduced accidents and obeying the road rules. These data collected can be used for future development and planning can avoid the accidents and to control speed limit in specific zone i.e., school zone and hospital zone etc for safety of human life and also detects road crossing objects.

III.OVERVIEW OF WORKING MODEL

The system consists of a transmitter and a receiver. The transmitter module is fixed at pre-determined lanes/areas. Speed limit is pre-programmed in microcontroller. This information is transmitted as wireless signals through Zigbee. This module is experimented with 6 zones namely(i) School zone ii) Hospital Zone (iii) Steep Curves Ahead (iv) Bridge Works Ahead (v) Hair Pin Bend Ahead (vi) Accident Prone Area Ahead. The speed limit of different zones may range from 30 km/hr to 40 km/hr.

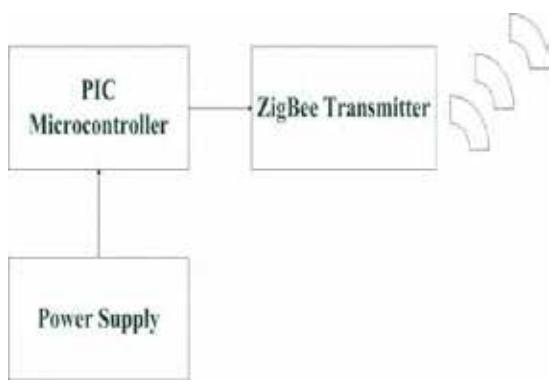

Fig.1 Block diagram of Transmitter section

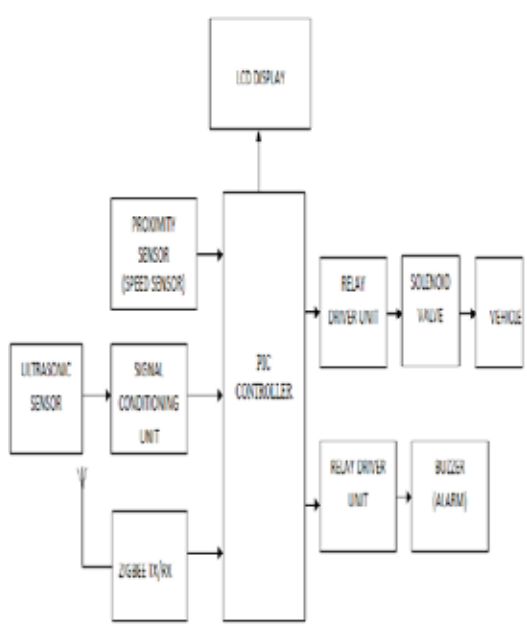

Fig.2 Block diagram of Transmitter section

The current speed of the vehicle is obtained from the speedometer by proximity sensor and this speed data is also sent to the microcontroller. The microcontroller compares the current speed with speed limit and a decision is taken here. The difference between the speed limit and the current vehicle speed is monitored continuously displayed in LCD as shown in figure 3 and also a acoustic warning is given to reduce speed when it's about to exceed the limit. If driver still doesn't reduce the speed, the microcontroller itself control the speed of vehicle.

Fig.3 Output showing the school Zone with speed limit

IV. IMPLEMENTATION

The microcontroller used is PIC 16F877A which acts as a kernel, belongs to mid-range family with in-built ADC (Analog to Digital Conversion). The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC-16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators,8 channels of 10-bit Analog-to-Digital converter, 2 capture / compare/ PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port. ZigBee CC2530 transceiver is used to send and receive data. Low power consumption which is a highlight in ZigBee makes it suitable to stand alone in real time for long period of time compared to other wireless protocols. Point-to-point communication is the communication between a sender and a receiver and Multi-point communication can have more than one transmitter and receiver, and it may vary depending on our need. The speed of the vehicle is measured by proximity sensor and checked with the programming by the microcontroller. The Programming algorithm checks for the exceeded speed, which is the difference between the speed limit and the vehicle speed. The flow of control is shown in figure 4 which explains the overall control logic. The speed limit is acquired as an input variable. Current speed of the vehicle is compared with the speed limit and appropriate action is taken based on the result of conditional execution. The driver is made aware of his driving behaviour and violations made so that careful and conscious driving can be achieved. Repeated violations lead to increase in penalty amount which effects in reduction of violations by the vehicle user. Wireless transmission is achieved with the help of Zigbee, which provides low cost transmission of data.

The ultrasonic sensor know as transceivers when they both send and receive, but more generally called transducers) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. Ultrasonic sensors are commonly used for a wide variety of noncontact presence, proximity, or distance measuring applications. Ultrasonic sound is a vibration at a frequency above the range of human hearing, usually >20 kHz. The microphones and loudspeakers used to receive and transmit the ultrasonic sound are called transducers. Most ultrasonic sensors use a single transducer to both transmit the sound pulse and receive the reflected echo, typically operating at frequencies between 40 kHz and 250 kHz.

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.Proximity sensor emits an electromagnetic field or a beamof electromagnetic radiation(infrared, for instance), and looks for changes in the field or return signal. Proximity sensors are also used in machine vibration monitoring to measure the variation in distance between a shaft and its support bearing. This is common in large steam turbines, compressors, and motors that use sleeve-type bearings.

When relay control coil is NOT energized, the relay switch contact are closed. When control coil is energized, the relay switch contacts open, which breaks the circuit open.In our project we use two relays. One for buzzer alarm and other for solenoidal valve.

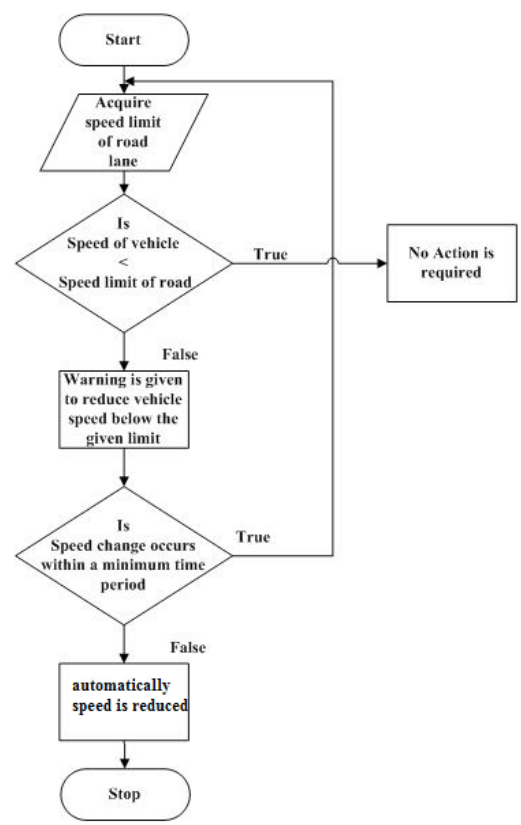

Fig.4 Flow of control

In an echo ranging system, the elapsed time between the emission of the ultrasonic pulse and its return to the receiver is measured. The range distance to the target is then computed using the speed of sound in the transmission medium, which is

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usually air. The accuracy of the target distance measurement is directly proportional to the accuracy of the speed of sound used in the calculation. The actual speed of sound is a function of both the composition and temperature of the medium through which the sound travels .

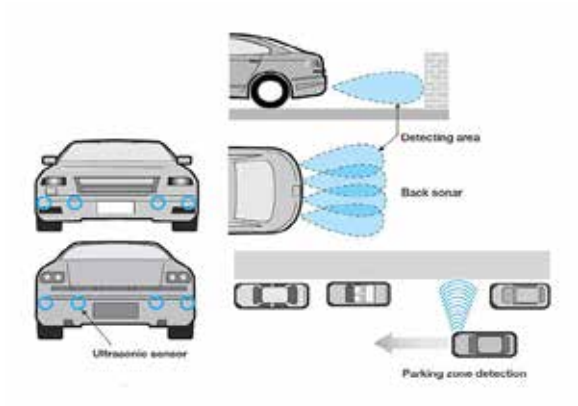

Fig.5 Ultrasonic in car

V. APPLICATION

- This implementation will be very useful for traffic personnel to regulate the speed control
- Traffic signs and information about alerts can be intimated to the vehicle users
- Insurance schemes can be implemented based on the driving behavior
- earlier implementations, this is a low cost method which is practically feasible.

VI. CONCLUSION

Our proposed system includes various applications using ZigBee, Ultrasonic Sensor, Proximity Sensor. Ultrasonic Sensor module for detecting obstacles in front of vehicle was interfaced and applications using ZigBee and Proximity Sensor have to be combined in the same module. The Proposed work, if implemented can avert lots of accidents and can save invaluable human lives and property. Implementation of such an advanced system can be made compulsory similar to wearing of seat belts so that accidents can be averted to some extent.

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