A SMART APPROACH FOR ROAD SAFETY OF PASSENGERS

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Abstract

One of the world's largest public health and injury deterrence problems is due to Road traffic crashers. It is difficult to count the daily road side accidents and death of people because of the drunken driving caused by lack of road traffic rules followers. A report by WHO in 2009 forecasts that more people die on roads in India than anywhere else in the world due to road trauma. Driver distraction, to weariness, to drunken driving (manual error) are the major cause of road accidents. This is an issue which could be easily overcome by the use of technology. Hence in this work, an automated system to improve the road safety of the passengers is considered. Alcohol sensor can be fitted inside vehicles to detect drunken driving and embedded with features like automatic speed control provides an efficient road safety system. It also includes horn control in no honking zones, speed control at school zones, hospitals, flyovers and suburbs and also alcohol detection to detect whether the driver is drunken or not.This system is easy to implement, which ensures maximum safety for drivers, passengers and pedestrians. The driver can get the safety information without any kind of distraction. The system is designed to ensure more reliability, security and safety for the vehicle owner and passengers.

Keywords- **Road safety for passengers, Road accidents, Speed control, Horn control, Alcohol detection**

I. INTRODUCTON

More people in India lose their lives due to poor road condition, over speed and increasing drunk and drive habits. Road accident occurs due to manual error. It mainly occurs due to high speed, drunken driving [1]. According to the statistics registered around 1.2 million peoples died and 20-25 million peoples get injured [3].

The accident rate has increased as more number of vehicles are imported in the society. During 2009, WHO(World Health Organisation) stated that in India, the rate of death is increased due to road accidents. The National Crime Records

(NCR) predicted that around 13 people perishin road accidents[2]. In India, the road death rate is increased to 6.1% during 2006-2007[3]. High end luxury cars like Audi, Mercedes Benz, Lamborghini, etc, comes with road safety features[4].

It is observed that, it is highly necessary that vehicles are equipped with some automatic systems, which ensures that the causalities due to negligent driving are reduced. Hence embedded system can be utilized to have such features in the vehicles. This work focuses on some major and repeated causality due to negligent driving.

This is achieved by using an Arduino based system, in order to differentiate the road safety, security and discipline. This cost effective system is successfully simulated (yet to be implemented) on the car, which is helpful to reduce the major causes of road accidents.

The issues addressed in the work are speed control in different regions (schools, flyovers and suburbs), horn control in horn prohibited regions such as hospitals, public libraries, etc., and alcohol detection to detect drunken driving.

A. NEED FOR THE SYSTEM:

This system is used to carry the constructive variation in the field of road security and safety. The causes of road accidents should be reduced and to sustain the traffic signal rules.

II. SYSTEM DESIGN

This system consists of two modules namely, Transmitter and Receiver module. The receiver module can be fitted inside the vehicle and the transmitter module should be placed on the road side sign board[11].In this work, ARDUINO UNO ATmega328p[5], Transmitter and Receiver module, Encoder chip, Decoder chip, Relay contactor, Alcohol sensor, DC Motor [10] and LCD display are used for this implementation.

Transmitter module:

The transmitter module consists of HT12E encoder [6] and RF transmitter as shown in Fig 1. The transmitter and receiver are required for transmitting and receiving the information. Here RF-433MHz transmitter [7] is used to transmit the data.The range of transmitter is 9–27square meters. It consists of following pins: Antenna, Data in, Ground pin and VCC.

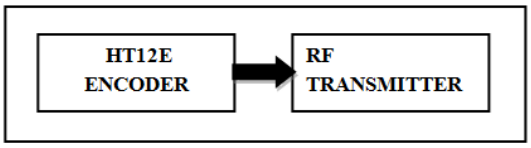

Fig. 1 Transmitter Module

HT12E Encoder is used to generate the data and it will be given to the receiver side decoder. The decoder is used to decode the current information and it will be enabled. The encoder output pin is connected to the RF Transmitter input pin.

Receiver module:

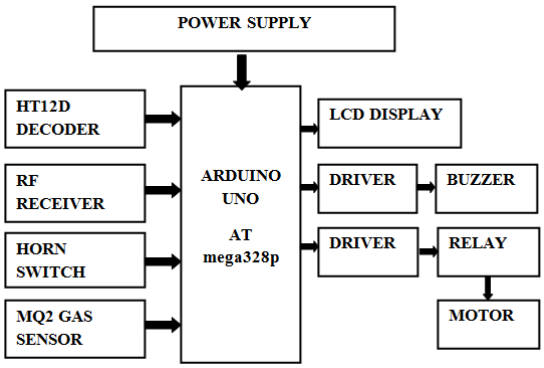

Fig. 2 Receiver module

The schematic diagram as shown in Fig 2 consistof Arduino UNO, HT12D Decoder, RF Receiver, MQ2 Gas Sensor, 12v DC motor and Relay Contactor. The Arduino has various features for communicating with a computer, another Arduino, or other microcontrollers[10]. It provides serial communication. The data is received(RF Receiver) from the RF transmitter. The RF receiver consists of four pins [7].

HT12D decoder [5] IC is used to receive the information from the RF transmitter and it will be decoded. The decoded information will be received by the RF receiver.

Alcohol sensor MQ2 [8] is used which consists of sensing and heater plate. Sensing plate is used to control the sensitivity. The alcohol is sensed by the sensing plate and it will be given to the microcontroller. Whenever the alcohol is sensed, the vehicle will be brought to halted condition.

The LCD display is used to display the appropriate message to identify the current status of the vehicle. Three relay contactors [9] are used to control the motor of the car. The relay consists of open state and closed state.

The first relay is used for motor ON and OFF condition. If motor is in ON condition, it operates at 12v and the relay is in closed state. If motor is in OFF condition, it operates at 0v and the relay is in open state. Whenever the alcohol is sensed by the alcohol sensor, the motor goes to OFF condition and operates at 0v and the vehicle is halted.

The second relay is used to control the speed of the motor. The motor normally runs at full speed such as 12v and the relay is in closed state. If the speed limit condition is received, the motor will operate at 6v and the relay is in open state. The model vehicle will be run at half of the input voltage.

The third relay is used to control the horn of the vehicle.Whenever the horn prohibition condition is received, the relay is in open state and the buzzer goes to OFF condition.

III. RESULTS AND DISCUSSIONS

A model car is used for implementing the proposed system. The receiver module is placed on the model car and the transmitter module is used for transmitting the condition. This module will work in the range of 1 square meter.

A. HARDWARE MODULE

The hardware module consists of Transmitter module and Receiver module as shown in Fig 3. The transmitter section components are HT12E encoder and RF transmitter. The receiver section components are HT12D decoder, RF receiver, Arduino UNO board, DC motor, LCD display.

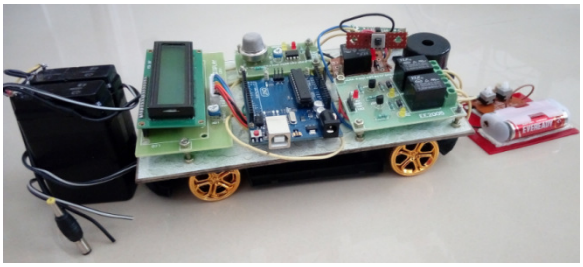

Fig. 3 Hardware for transmitter and receiver module

SPEED CONTROL:

The relay is used to control the speed of the model car. When the relay is in closed state, the model car runs at full speed (12V). When the speed limit condition is transmitted and it is received, the relay goes to open state. The model car runs at half of the full speed (6V). The normal speed and speed limit condition is displayed on the LCD as shown in Fig 4.

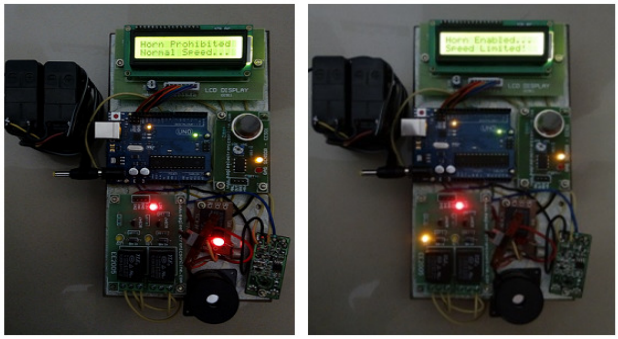

Fig. 4 Speed limit condition

HORN CONTROL:

The relay is used to control the horn of the vehicle. If the relay is in closed state, the buzzer goes to ON condition. When the horn prohibition condition is transmitted and it is received, the relay is in open state, the buzzer goes to OFF condition. In this condition when the driver presses the horn the

sound will be muted. The horn is replaced by the buzzer in the model car. It is shown in Fig 5.

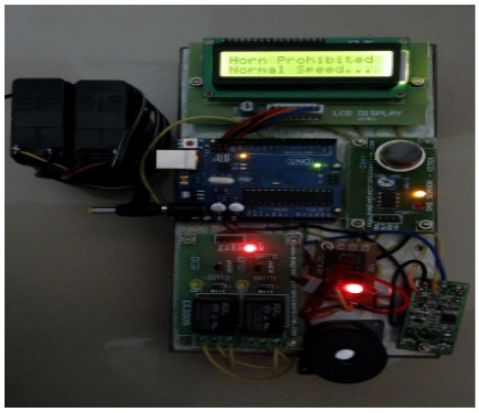

Fig. 5 Horn prohibition condition

ALCOHOL DETECTION:

The MQ2 gas sensor is used to sense the presence of any combustible gases. It will be operated at5v. The output of gas sensor is given to the microcontroller. The Alcohol Sensed message will be displayed on the LCD display, whenever the tested sample liquid solution contains above 30% of alcohol content that is shown in Fig 6. The Arduino board is used to convey the output, that the relay is in open state and the model car will be halted and it operates at 0v.

Fig. 6 Alcohol detection condition

IV. SIGNIFICANCE OF THE WORK

This system is easy to implement, which ensures maximum safety for drivers, passengers and pedestrians. The driver can get the information without any kind of distraction. This system successfully designed which will ensure more reliability, security and safety for the vehicle owner and passengers.

V. ECONOMICAL FEASIBLITY

The system can be more efficiently used for heavy duty locomotives and automobiles, which are the main cause for accidents. The cost of the system is very less and hence the model can be easily installed in all types of cars.

VI. RESULT COMPARISON CHART

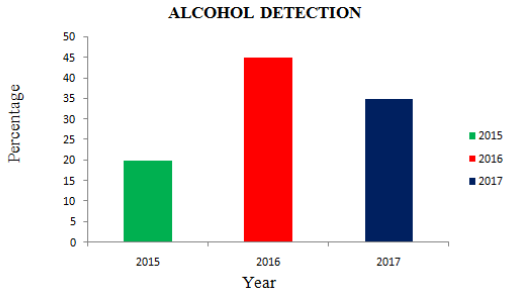

Fig. 7 Comparison chart for Alcohol Detection

In Fig 7 it could be noticed that during the year 2017 using Arduino based sensor detection of the alcohol content was achieved with 35 % of efficiency.

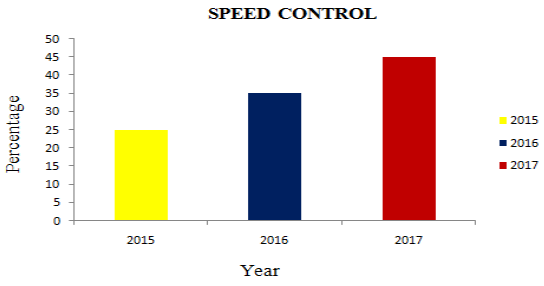

Fig. 8 Comparison chart for speed control

In Fig 8, it could be noted that during year 2017 an efficiency of 45% was achieved in the detection of speed control in model car using Arduino based system.

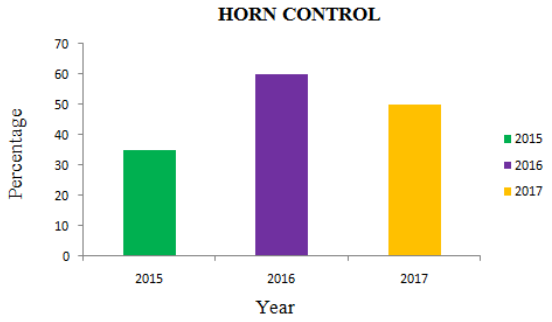

Fig. 9 Comparison Chart for Horn Control

In Fig 9, it could be noted that during year 2016 an efficiency of 60% was achieved in the detection of horn control in model car using Arduino based system.

VII. CONCLUSION

Having a safe drive for the passengers is of prime importance for any road commuters. In this system, vehicle speed control, horn control in horn prohibited areas and detection of drunken driving are included and the circuit was designed on the module car. A Liquid Crystal Display (LCD) is used to display the working condition such as speed limit condition, horn prohibition condition and alcohol detection condition. The working conditions were verified in the model and the expected output is achieved.

VIII. FUTURE SCOPE

The future scope focuses on creating a device at low cost which helps in hands-free safe driving.

REFERENCES

[1] Adam Abaker Hussain, Mohammed El-doumaAbdelgadir El-douma,MohammedYousifAlamain Abdurrahman, Salah El-haj Adam Ismail, "Vehicle's Automatic Speed Control Using RFID",Journal of Technical Innovation in Modern Engineering & Science,Vol-3, NO.10, 2015.

[2] http://articles.timesofindia.indiatimes.com/2009-08-17/india/28181973_1_roadaccidents-road-fatalities-global-road-safety.

[3] http://zeenews.india.com/news/nation/india-no-1-in-roadaccidentdeaths_704455.html.

[4] Benliang Li, Houjun Wang, Bin Yan and Chijun Zhang, "The Research of Applying Wireless Sensor Networks to IntelligentTransportation System IT Based On IEEE 802.15.4", 6th International Conference on ITS Telecommunications Proceedings, , 2006, pp. 939-942.

[5] http://www.atmel.com/Images/Atmel-42735-8-bit-AVRMicrocontrollerATmega328-328P_Summary.pdf

[6] http://www.engineersgarage.com/electronic-components/ht12e.

[7] http://www.sproboticworks.com/products/gsm-gps/sim-300-module.html

[8] http://www.sparkfun.com/datasheets/Sensors/MQ-2.pdf

[9] http://www.allaboutcircuits.com/vol_4/chpt_5/2.html.

[10] http://www.engineersgarage.com/tutorials/89s51-89s52-programmerbasics?Page=1.

[11] International Conference on Inventive Communication and Computational Technologies (ICICCT), "An Arduino based Embedded System in PassengerCar for Road Safety",978-1-5090-5297-4/17/$31.00 ©2017 IEEE.

[12] Sasikumar, K., et al. "Travolution-An Embedded System in Passenger Car For Road Safety." *Sensors* 450 (2016): 16X2.

[13] Aruna, B., and Y. Prakash Rao. "An Intelligent Vehicle Controlling and Monitoring using Embedded GSM interface."