Driver Assist System (DAS) to Prevent Road Accidents

Jayalakshmi .R[1], Haripriya .K[2]
Student, Department of Biomedical Instrumentation Engineering,
Avinashilingam Institute of Home science and higher education for women, Coimbatore
1jlakshmi.rammohan@gmail.com, 2priyakrishnamoorthi112@gmail.com

Abstract— Accidents occurring in traffic are increasing every day with the Statistics of 2015 reported, at least 10 people died and another 35 were injured when a bus fell into a ditch on February 4,2015 while travelling between the Indian cities of Pune and Satara. The risk that comes along with footboard travelling in buses has taken many lives. With accidents reported, 4 students travelling on footboard of an overcrowded bus were crashed to death fatally against a lorry on 10th December, 2012 at Rajiv Gandhi Salai, Chennai. Footboard travelling in buses is dangerous and the event must be prevented by implementing a system with advanced technology that stops passengers from travelling in footboard. In typical Metropolitan buses doors are available to shut off after the passenger boards and disembark the bus. But this is not anti-tampered and so it causes the drivers to easily falsify it. The DAS features a system in which the microcontroller continuously monitors the output from the sensors placed in the footboard of the bus and stops the bus if a person stands on the footboard for more than the programmed time. The system also has advanced lane detection system and IR based driver fatigue identifying system. This system comprises of the distance reflective sensor that can prevents accidents by controlling vehicle speed. It also incorporates a LCD display of the passenger count and LED indication about seat availability to the commuters outside the bus.

Keywords-*footboard; driver; accidents; lane; prevention*

*****

I. INTRODUCTION

About 33 accidents were reported due to rash and negligent driving of DTC bus drivers during 2013-2014.In 2009-10, 10 accidents has happened when passengers were alighting DTC buses, while another 7 cases were recorded when passengers were boarding DTC buses[3]. Our system is designed in a simple and effective way to avoid this kind of mishap. The approach given in this paper is to include an electronic control unit (ECU) that continuously supervises the footboard of the bus for presence of the person. The system detects the person standing in the footboard and alerts the driver about it at once .The passenger should get onto the bus only then the bus can move else if the person continues to stand in footboard itself the bus stops automatically. After the passenger enters or exits the bus as he would wish the driver can restart the bus again.

The total number of accidents reported due to fault of Driver is 63658 as proclaimed by State Transport Authority, Government of Tamil Nadu. 2013. The advanced DAS system consists of a driver warning system with simple LDR based lane detection and IR implemented eye blink sensor.

II. PROPOSED SYSTEM

The DAS involves advanced technology to reduce footboard accidents. A prototype can be set up in bus so that the life of passengers travelling in buses is not endangered. This project also has features like automatic speed control when an adjacent vehicle is about to hit the bus. Accidents can be averted which may occur due to carelessness of the driver. Also the number of passengers boarding the bus is counted simultaneously by means of load cell and IR array sensors placed in the steps of the bus. A clear indication of number of passengers inside the bus is displayed outside the bus and it helps the passengers to know the availability of seats even before boarding the bus.

The proposed system architecture is shown in the figure.1.The ECU detects the passengers standing in footboard and sends warning alarm to the driver about the situation. The passenger stands in the foot board without accepting to travel safely the bus will be stopped automatically. The driver can restart the bus again and continue to drive safely after the passenger entered into the bus.

The eye blink and LDR sensors play a vital role in avoiding accidents that are caused due to driver's casualness and unconsciousness.

III. OBJECTIVE AND SCOPE

The main objective is to develop an effective system for preventing footboard accidents with load cell and IR array setup in the steps of the bus. The reason for using two sensors is to make the system false proof and non manipulative.

The goal of our project is as follows:

- To avert accidents that occur due to carelessness of the driver.
- To develop a system that can assist the driver for safer driving.
- To deploy these systems in real time environment.
- To tailor the working of the framework suitable for implementation.

IV. SYSTEM OVERVIEW

The overall block diagram is shown in figure.7.The components used in the proposed system are as follows,

- Sensor unit
- Microcontroller
- LCD and LED
- Buzzer

- Motors

A. Sensor unit

The Sensors incorporated in the proposed system are given below, each block describes about the components and modules used in the systems. The major blocks are,

- Load cell and IR array
- LDR sensor
- Eye blink Sensor
- Reflective Sensor

1) Load cell and IR array

These two sensors are placed in the footboard of the bus and continuously send signal to the microcontroller. For this prototype we have used 3132 - Micro Load Cell (10kg) - CZL601 .When there is a person on the steps of the bus, the load cell senses the load and converts it into electrical signal also at the same time the IR signal transmission is cut off. Hence the Buzzer is set on to warn the passenger and the driver. If the buzzer is not taken seriously by any of them the system is self-programmed to cease the bus automatically as indicated in figure.3.

2) LDR Sensor

The LDR and LED setup is placed on both left and right sides of the bus. In this project we have used two pairs of LDR and LED setup to track lanes to have accurate lane detection system.. The lane detection can be explained based on the following algorithm given in table.1.

Table.1.Algorithm of Lane detection system

S.NO	LDR1	LDR2
1.	Black	Black
2.	White	Black
3.	Black	White

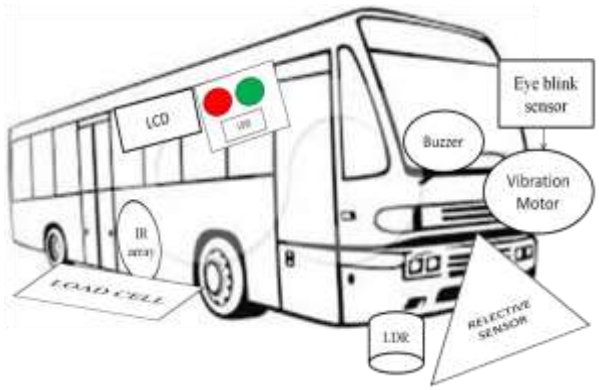

Fig.1. Proposed system Architecture

The lane is tracked based on the principle such that black absorbs most of the light emitted by the LED and so the light rays reflected are reduced, which produces low resistance and ultimately voltage also decreases. Whereas white less absorption of light causes resistance and voltage to increase, thereby indicating lane crossing. This feature is very useful and can prevent accidents occurring due to lackadaisical of the driver. The existing methods for tracking lanes using image processing are considered to be very expensive. This simple setup reduces the risk very effectively in low cost. The LDR and LED setup used in this project is shown in figure.5.

3) Eye blink Sensor

In recent times drowsiness is considered to be one of the reasons for accident happening in highways. The IR rays are transmitted continuously in to the eye. The reflected rays are received by the IR Receiver. If the eyes are closed the output of the IR receiver is high otherwise low [2]. If the driver is found unconscious the circuit activates a Vibration in the driver's ear to wake him up and displays the warning message as represented in the figure.2. At the same time the Reflective sensor controls the speed of the vehicle at that situation.

B. PIC 16F877A Microcontroller

The microcontroller used in this project is PIC 16F877A.The core architecture used is high-performance RISC CPU with only 35 single word instructions. The output from the sensors is fed to the input port of the microcontroller and the conditions that are programmed are continuously monitored. The required action at that instant is performed by the microcontroller via output port.

C. LCD and LED

The two LCD displays are placed one outside the bus and another near the driver steering. All the alerts given to the driver as well as the passenger is given in the display. It also shows the Number of passengers inside the bus in real time. The LED indication is an advantageous asset to the passengers boarding the bus. The Green LED shows that the passengers can board the bus since there are seats available. The Red LED denotes that the bus is houseful.

D. Buzzer

The buzzer is used to alert the driver whenever the passenger stands in footboard continuously.

The eye blink sensor and also LDR, LED setup also sets on an alarm to indicate the warning situation to the driver.

E. Motor

The proposed system consists of three types of motors for different applications. This prototype is implemented using DC Motor instead of engine. In real-time application of the system the fuel to the engine can be controlled

automatically with a solenoid valve. The vibration motor is another motor used in this project to awaken the driver if he is found drowsy.

V. SOFTWARE

MPLAB Integrated Development Environment (IDE) is a free, integrated environment for the development of embedded applications employing Microchip's PIC8bit, 16bit and 32bit microcontrollers. MPLAB is an easy to use toolset and contains software components for faster application creation and debugging. PICPgm is a PC-Software to program PIC microcontrollers using external programmer hardware connected to the PC.

Proteus 7.0 is the Circuit Simulation software that uses a SPICE3f5 analogue simulator kernel combined with an event-driven digital simulator that allow users to utilize any SPICE model by any manufacturer [4].The results obtained using the Proteus Simulator is shown in figure.6.The advantages of this simulation platform are

- Real time simulation.
- Time and money saving.

VI. HIGHLIGHTS

The advantages of the proposed system are as follows:

- Footboard accidents which are a major reason for accidents in buses can be stopped completely.
- Smart Transportation Prevents bus driver from being cornered legally due to accident cases.
- Helps passengers know seat availability even before boarding bus.
- Accidents caused due to fatigue can be avoided.
- Spectacle are used to detect the eye movement and closure, it's free from reflection & easy to use.
- Prevents bus driver from being cornered legally due to accident cases.

Fig.2. Driver Warning alert Indication on the display

Fig.3. Engine shutoff indication on the display

VII. DISCUSSIONS AND CONCLUSION

The DAS is an effective and affordable system that can be implemented using simple circuitry which could save more lives with easy setup features [1].It is a simple way to stop passengers from travelling in footboard. This is because of the fact that the driver is not able to control his vehicle when he is asleep and by the time he realizes it, there is an accident. The vehicle is at a very high speed on highways due to which handling is tough and getting the vehicle to halt in such a condition is difficult.The eye blink sensor for driver blink detection and LDR based Lane detection can prevent most of such accidents.

This system can be furthur enhanced by GSM and GPS system to report the bus location when there is an accident. This system can be developed with features like automatic door opening and closing. The results are simulated using Proteus software and displayed in the computer monitor. The automatic bus ceasing process is executed using DC Motor. Also the driver fatigue detection using eye blink sensor and LDR based lane detection system has been done and the output is displayed. The hardware setup of the developed system is shown in figure.2.

Fig.4. Hardware model

Fig.5.LDR and LED setup for lane detection

 ISSN: 2321-8169
1613 - 1616

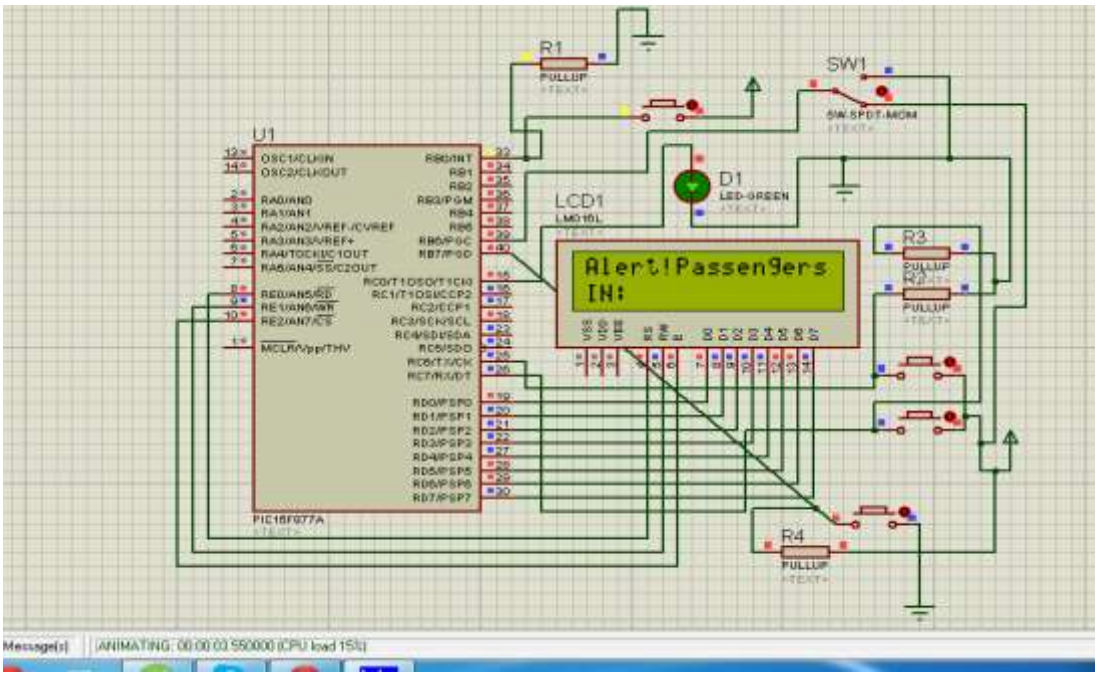

Fig.6.Overall System simulated using Proteus tool

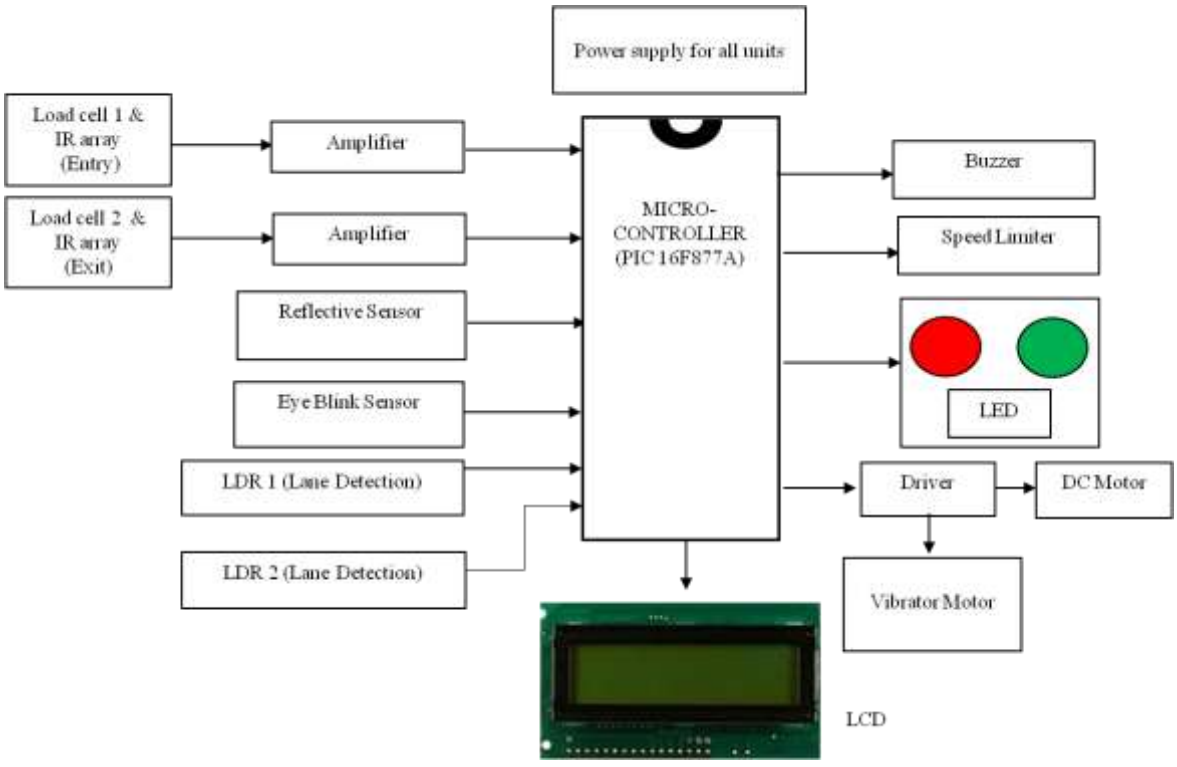

Fig.7. Block Diagram

REFERENCES

[1] S. Rohit, Shriram K. Vasudevan, S. Lokesh, K. Ajeeth and Vineet Nair," An Intelligent and Cost Effective Footboard Accident Prevention System". Information Technology Journal, vol.12,issue.11,pp.2265-2268,2013.

[2] B.Praveenkumar, K.Mahendrakan ,"Prevention of Accident Due To Drowsy By Using Eye Blink", International Journal of Innovative Research in Science,Engineering and Technology,Vol. 3, Issue 5, ISSN: 2319-8753,May.2014.

[3] http://ibnlive.in.com/news/dtc-buses-cause-239-accidents-in-5-years-due-to-rash-driving/505630-3-244.html

[4] http://proteus-professional.software.informer.com