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Implementation of the Driver Drowsiness Detection System

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Abstract: **This paper is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself. Driver fatigue resulting from sleep deprivation or sleep disorders is an important factor in the increasing number of accidents on today's roads. In this paper, we describe a real-time safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. In this paper, we propose a driver drowsiness detection system in which sensor like eye blink sensor are used for detecting drowsiness of driver .If the driver is found to have sleep, buzzer will start buzzing and then turns the vehicle ignition off .**

Keywords: ARM7, Buzzer, Eye blink sensor.

I. INTRODUCTION

Driver fatigue is a significant factor in a large number of vehicle accidents. The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that Drowsiness presents on the road, methods need to be developed for counteracting its affects .The aim of this project is to develop a prototype drowsiness detection system. The focus will be placed on designing a system that will accurately monitor the open or closed state of the driver's eyes in real-time. In today's world where science has made amazing advances so have the recent cars. These cars are more advanced than ever. But now a days ,due to driver drowsiness accidents are increasing day by day. Driver Drowsiness and then they do rash driving as of that they do not have control on themselves. Here we designed a system which will detect driver drowsiness. Once drowsiness is detected then buzzer will on and turns the vehicle ignition off . Then vehicle will stop immediately.

Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the driver is drowsy. Driver drowsiness is recognized as an important factor in the vehicle accidents. The National Sleep Foundation (NSF) reported that 51% of adult drivers had driven a vehicle while feeling drowsy and 17% had actually fallen asleep. Therefore real-time drowsiness monitoring is important to avoid traffic accidents. This paper involves controlling accident due to unconscious through Eye blink. Here one eye blink sensor is fixed in vehicle where if driver looses conscious and indicate through buzzer.

The car simulator study was designed to collect physiological data for validation of this technology. Methodology for analysis of physiological data, independent assessment of driver drowsiness and development of drowsiness detection algorithm by means of sequential fitting and selection If the driver is found to have sleep, it warns and then turns the ignition off. And hence possibility of accident is avoided.

II. RELATED WORK

A. ARM7LPC2148

ARM stands for Advanced RISC Machines. It is a 32bit processor core used for high end applications. The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high speed flash memory ranging from 32KB to 512KB. ARM (Advanced RISC Machine)T–The Thumb 16 bit instruction set. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate [4]. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

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Fig1: ARM7 Controller.

B. EYE BLINK SENSOR

It is necessary in our working to find the blinking of eye, since it is used to drive the device and to operate events. So blink detection has to be done, for which we can avail readily available blink detectors in market (Catalog No. 9008 of Enable devices) or we can incorporate it with a special instruction written in image processing that, if there is no pupil found for the certain period of pre-determined i.e. time greater than the human eye blinking time then consider an event called "blink", for which the set of operations will be followed. Here, in this case we need to set time as 1 second or above it, as "blink event" is different from "normal eye blinking". We need to perform testing for only blink event estimation, and not to find normal eye blinking.

Fig.2: Module for Eye Blinks Detection.

Fig2 shows the setup of IR sensors that is to be used by the driver for Eye blink detection.

2.3 *IR SENSOR*

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator. The comparator is constructed with LM 358 operational amplifier. In the comparator circuit the reference voltage is given to inverting input terminal. The non inverting input terminal is connected IR receiver. When interrupt the IR rays between the IR transmitter and receiver, the IR receiver is not conducting. So the comparator non inverting input terminal voltage is higher then inverting input. Now the comparator output is in the range of +5V. This voltage is given to microcontroller and led so led will glow. When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is lower than inverting input. Now the comparator output is GND. So the output is given to microcontroller. This circuit is mainly used to for counting eye blinks.

III. SYSTEM IMPLEMENTATION AND RESULTS

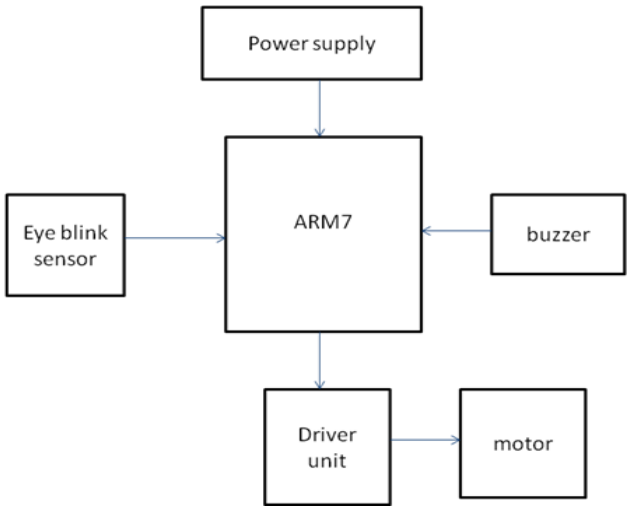

Fig 3: Block Diagram of Driver Drowsiness Detection System.

A. FLOW OF OPERATION

Implementing an automated security system to vehicles that provides high security to driver, designing an eye blink sensor which continuously monitors the number of times the eye blinks, if the eye blinks count decreases that means the driver is sleepy at that time buzzer will on and then turn the vehicle's ignition off .This paper involves measuring the eye blinks using IR sensor. There are two sections in IR sensor .The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed then the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye closing or opening position.

In the transmitter section, eye blink sensor is placed near the eye to sense the blink count and this information is transmitted in the form of pulses and is given to the ARM7 Microcontroller. The ARM7 processor uses this information to compare with the normal eye blink programmed in the chip and if any abnormal situation arises, the vehicle is stopped with an buzzer indication, this operation is enabled by means of the driver circuit connected to the vehicle motor and the signal is transmitted via RF-transmitter at the frequency of 433.92 MHz's .In the Receiver side the

transmitted signal is received and the signal is decoded and given to the Microcontroller, which uses this information for displaying the alert message in the LCD as programmed, simultaneously a buzzer alert is given then vehicle is stopped immediately.

B. Algorithm

The algorithm is as follows
Step1: Initialization of process
Step2: Sense the data from eye blink sensor
Step3: If the data send by sensor
Step4: Process the sensed data
Step5: Check the mode
Step6: Normal mode else sleeping mode
Step7: Normal mode
step8: Engine on
Step9: Else if sleeping mode
Step10: Buzzer on
Step11: Engine off
Step12: stop the process

The result shown in the figures was received from the eye blink sensor. Here we have designed an eye blink sensor which continuously monitors the number of times the eye blinks, if the eye blinks count decreases that means the driver is sleepy, in that case a buzzer is operated and then turns the vehicle ignition off and hence possibility of accident is avoided.

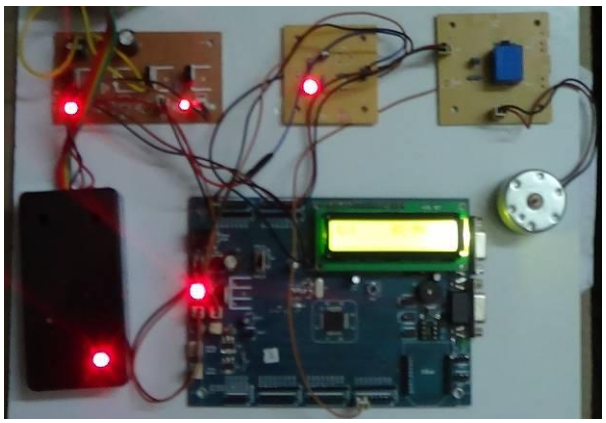

Fig 4: Driver Drowsiness Detection System.

Fig 5: Eye Blink Detection system.

Fig 6: Eye Blink Counting Displaying on LCD.

Fig 7: Eye Blink Counting when Driver is in Normal Condition.

Fig 8: Eye Blink Count when Driver is in Sleeping Condition.

IV. CONCLUSION AND FUTURE SCOPE

The analysis and design of driver drowsiness detection system is presented. The proposed system is used to avoid various road accidents caused by drowsy driving. And also this system used for security purpose of a driver .This paper involves controlling accident due to unconsciousness through Eye blink. Here one eye blink sensor is fixed in vehicle where if driver looses consciousness, then it alerts the driver through buzzer to prevent vehicle from accident. In future we can implement Drowsiness Detection System in aircraft in order to alert pilot.

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VI. BIBLIOGRAPHY

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