Intelligent Car System to Prevent Accident Due to Exhaustion

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ABSTRACT
This Paper is based on the road accidents occurring due to driving while intoxicated or negligence of the driver health anomaly of the driver and enhances the security system of the vehicle. As an occurrence of death by accident rate is increasing day by day, the above mentioned are implemented to reduce the accident rate. The accidents due to the drowsy state of the driver is prevented using eye blink sensor. Similarly accidents due to the intoxicated state are prevented using alcohol sensor which detects the alcohol from breath of the driver, if the driver is drunk then the buzzer indicates and the vehicle doesn't allow the driver to start the vehicle. If the driver is heavy-eyed, then the system will give buzzer signal and the speed of the vehicle is reduced.

Keywords
Driver exhaustion perception, Alcohol detection in vehicles, Automatic vehicle movement control, IR sensor.

1. INTRODUCTION
Driver exhaustion is recognized as an important factor in the collision. It is known that driving execution become progressively worse with increased exhaustion with resulting strikes constituting more of all collision. Advanced technology offers some expectation to avoid these up to some stretch. This project involves measure of eye blink using IR sensor. The infrared rays are transmitted in to our eye using the IR transmitter. The reflected infrared rays from the eye are received using the IR Receiver. If the eye remains unmoved or not blinked then the signal from receiver is high otherwise the receiver signal is low. This is to know whether the eye is blinking or is in the same Position. Then the signal is given to the circuit to trigger the alarm. This project involves controlling accident due to exhaustion through Eye blink. Here one eye blinks Sensor is fixed in a spectacles where if anybody loses conscious then it is indicated through alarm.

The IR sensor was constructed of a paired of IR LED and IR photodiode. The sensor was attached to the implanted holder and positioned in front of the eye using a spectacle. During eye blink perception, IR light from the LED illuminates the eye and reflected IR light induces an electrical current through the IR photodiode.As the eyelid closes, increasingly more IR light is reflected on the photodiode, since the eyelid has a higher IR reflectivity than the cornea. The resulting IR signal is amplified, digitized, and recorded on a computer data acquisition system.The sensor is held at an angle with working distance to the eye of approximately from the front edge of the block compared to a working distance.The sensor eliminates ambient IR noise by using high frequency, pulsed IR illumination, much like a carrier wave in amplitude-modulated radio waves. Because the illuminating LED is pulsed at a high frequency (62.5 kHz), changes in reflectivity of the eye during a blink cause modulation of the amplitude of the reflected IR carrier wave. This produces a signal containing the desired demodulated information, as well as undesirable high frequency content around the carrier frequency and also higher harmonics of the carrier.
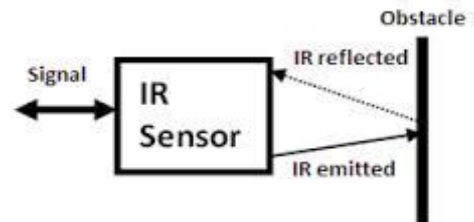

Fig 1 Principle of working

1.1 Basic model of the system
The block diagram depicts the total blue print of the proposed project. The total essence and the functioning of the project are represented in a single block diagram. They include

- LM358 Comparator
- Eye Blink Sensor
- LCD
- Microcontroller
- Alarm
- Alcohol Sensor
- Seat Belt indicator

1.2 Scope
If we do all the vehicles with automated security system that provides high security to driver, which also gives alarm All vehicles should be equipped with eye blink sensor and alcohol detector in future to avoid these types of Collisions.

1.3 Function
This project involves measure of eye blink using IR sensor. If the eye is closed means the signal from the receiver is high otherwise the receiver signal is low. This is to know whether the eye is blinking or is it in the same Position. This output is given to circuit to trigger the alarm.This project involves controlling accident due to exhaustion through Eye blink [2]. Here one eye blink sensor is fixed in spectacle where if anybody loses conscious and indicate through alarm. The Objective of this project is to develop a system to keep the vehicle secure and protect it by the occupation of the intruders.

2. RELATED WORKS
Driver exhaustion resulting in reduced vehicle control is one of the major causes of road accidents. Driving execution become progressively worse with increased exhaustion with resulting crashes constituting 20%-23% of all collision [7]. According to the National Sleep Foundation's 2005 Sleep in America poll, 60% of adult drivers – about 168 million people say they have driven a vehicle while feeling heavy-eyed in the past year, and more than one-third, (37% or 103 million

people), have actually fallen dormant at the wheel! In fact, of those who have nodded off, 13% say they have done so at least once a month. Four percent – approximately eleven million drivers – admit they have had an accident or near accident because they dozed off or were too tired to drive.

2.1 Who's more likely to drive heavy-eyed?

* Commercial Drivers.

* Shift workers (work the night shift or long shifts).
* Drivers with untreated sleep disorders such as sleep apnea.
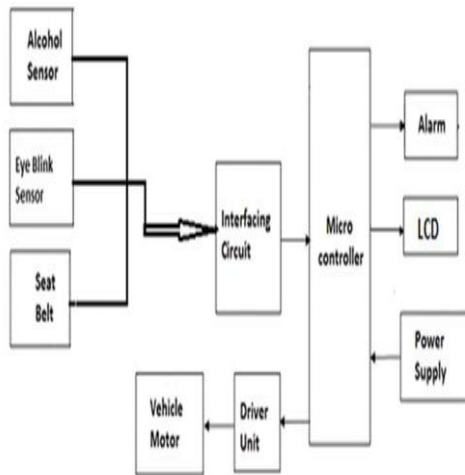* Drivers who use sedating medications.

Fig 2 Block diagram

2.2 Eye Blink Detection

This project involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit the infrared rays in our eye [5]. The IR receiver is used to receive the reflected infrared rays of heavy-eye. If the eye is closed means the signal from IR receiver is high otherwise the IR receiver signal is low. This to know the eye is blinking or is in the same Position. This output is given to logic circuit to indicate the alarm. This project helps in controlling accidents due to stupefaction through Eye blink [5]. Here one eye blink sensor is fixed in vehicle where if driver loses alertness, then it is indicate through alarm.

2.3 Ignition key

Ignition key acts as a switch, and serves as a key for any vehicle to start up the engine. So that the driver of the vehicle was continuously monitored by the sensor. A vehicle ignition key device directly activates a rotary switch by a rotation driving mechanism remotely driven by an external control signal for stopping the engine of the vehicles, the rotary switch can be placed in ON, OFF and START positions by key operation, and a rotation driving mechanism activates the switch in each of the positions by receiving an external dispatched signal [5].

2.4 Alcohol sensor

The sensing element detects the alcohol content from the breath of the driver continuously and amplifies it to give a switching pulse output and alarms the driver through the recorded voice and LCD [8]. It detects the alcohol content

continuously to sense the driver's drunken state and alerts the driver.

3. PREVENTION OF ACCIDENT DUE TO EXHAUSTION BY EYE BLINK SENSOR

3.1 Block diagram

This is because of the fact that the driver is not able to control his vehicle when he is dormant and by the time he realizes it, there is a collision. 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. Due to this many automobile companies are trying to research onto how a collision which occurs due to driver tiredness can be prevented. In this project we will generate a model which can prevent such an incident.

The Purpose of such a model is to advance a system to detect tiredness symptoms in drivers and control the speed of vehicle to avoid collisions. The main constituents of the system consists of an eye blink sensor for driver blink acquisition and an adaptive speed controller designed using stepper motor for providing precise positioning of the throttle valve to control the speed of vehicle.

The detection Layer is responsible to collect the information from sensors other sources to enrich the information with logical information and delivers it to the base station microcontroller unit [6]. Additionally the perception or the sensing unit in the model and base station unit provides simple methods for the application for performing the required work to be done.

3.2 Sensing unit

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter [7]. 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 than inverting input. Now the comparator output is in the range of +5V. This voltage is given to microcontroller or PC and led so led will glow.
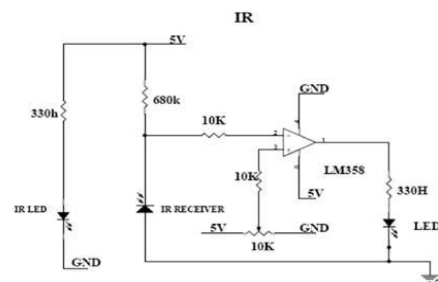

Fig 3 IR Sensing circuit

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 or PC. This circuit is mainly used to for counting application Intruder detector etc.
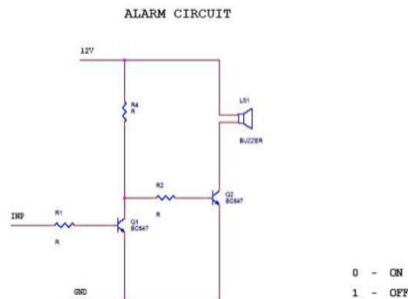

Fig 4 Alarm circuit

3.3 Base station unit

Microcontroller is a general purpose device, which integrates a number of the constituents of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer. Microcontrollers are smaller in size, Consumes less power, Inexpensive [6]. A microcontroller combines on to the same microchip:

- The CPU core
- Memory (both ROM and RAM)
- some parallel digital i/o
- A timer module to perform tasks for certain time periods.
- A serial I/O port to transfer data between the controller and other devices such as a PIC
- An ADC to accept analogue input data for processing.

Microcontroller is a standalone unit, which can perform functions on its own without any requirement for additional hardware. The heart of the microcontroller is the CPU core. In the past, this has traditionally been based on a 8-bit microprocessor unit. For example Motorola 6800.

The ATmega32A is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32A achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed [6].

3.4 Application layer

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a present time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high-pitched tone [11]. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

4. TESTING AND RESULT

The exhaustion level perception through eye-blink sensor and the consumption of alcohol by the driver is identified & alerted through buzzer and LCD.

Determine the minimum eye blinks of a normal person per minute (12 – 15), which is considered as the threshold.

1. Connect the IR circuit to the board using desired pin configurations so that it will detect the eye blinks of the person driving the vehicle.
2. Apply the power supply to the microcontroller circuit, reset it before processing.
3. Check the eye blinks of a driving person for 5 second, which is considered as threshold time.
4. After detecting the eye blinks compare it with the threshold and check whether the person is sleepy or awake.
5. If the person is closing his eyes continuously 5 second delay then he is considered as sleepy person, then display the message on LCD as "Warning" and slow down the vehicle by giving an alarm sound through Buzzer.
6. Perception of eye blinks of the person driving vehicle is calculated with IR circuit. Displayed the calculated eye blinks using the LCD.
7. Controlling of the vehicle when the person is sleeping so that it should not met with any collisions. Providing the caution for the driver to awake by using the Buzzer circuit which alarms sound continuously.

5. CONCLUSION

It has been daily trend for us to read lot of collision in newspaper happened mainly because of over speeding of vehicle i.e. rash driving, not following sign board and tiredness states of driver like heavy-eyed, drunken state. In order to prevent this problem a device was designed for preventing collisions.

Eye based control will be the future of all types of device control, thus making the operation so comfortable and much easier with less human presence. Several risk operations can be easily performed with this type of application and further research and study on these areas will create a new trend of interacting with machines. Hence, a system to monitor tiredness by detecting eye blink & head movement was developed using algorithms.

IR eye blink detector is a non-invasive, remote-sensing instrument that provides integral, yet accurate, measurement of the eye blink. The setup of this method for experiments is quick and simple. It is well suited for experiments that intend to measure movements of the external eyelids in the rabbit. The application of this instrument in smaller animals would require the miniaturization of the sensor head and cable leads. The wide field-of-view and the size of this detector would allow direct application for experiments involving human subjects.This system only looks at the number of consecutive frames where the eyes are closed. At that point it may be too late to issue the warning. By studying eye movement patterns, it is possible to find a method to generate the warning sooner. Instead of alarm we can use Automatic Braking System which will reduce the speed of the car. Using Pressure sensor on the

steering alarm or Automatic braking System can be set in case of exhaustion. By using wire-less technology such as Car Talk2000 If the driver gets a heart attack or he is drunk it will send signals to vehicles nearby about this so driver become alert.

5.1 Possible Improvements

- This system only looks at the number of consecutive frames where the eyes are closed. At that point it may be too late to issue the warning. By studying eye movement patterns, it is possible to find a method to generate the warning in lesser time.
- Instead of alarm we can use Automatic Braking System which will reduce the speed of the car.
- Using Pressure sensor on the steering alarm or Automatic braking System can be set in case of exhaustion.
- By using wire-less technology such as Car Talk2000 if the driver gets a heart attack or he is drunk it will send signals to vehicles nearby about this so driver become alert.
- In future we can expect the IR pair sensors being embedded in spectacles it so minute that it doesn't obstruct the view of the driver.
- By using a camera and image processing techniques we can monitor the eye blink of driver and make the model still more précised.

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