INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN: 2278 – 0211 (Online)

Automatic Vehicle Control Using Sensors

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Abstract:

Driver fatigue resulting from sleep deprivation or sleep disorders is an important factor in the increasing number of accidents on today's roads. Here, we describe a real-time online 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. The main components of the system consists of a eye blink sensor for driver fatigue detection, and an adaptive speed controller designed using the theory of sliding mode servo control for providing precise positioning of the throttle valve to control speed of vehicle.

The main idea is to develop a nonintrusive system which can detect fatigue of the driver and issues a timely warning. Since, a large number of road accidents occur due to the driver drowsiness. It will monitor the driver's eyes using eye blink sensor and detects the symptoms of driver's fatigue early enough and control the vehicle to avoid accidents. So this system will be helpful in detecting driver fatigue in advance consequently stops the vehicle automatically and will give warning output in form of sound. Moreover the warning will be deactivated manually rather than automatically. So for this purpose a deactivation switch will be used to deactivate warning.

Key words*:Fatigue Detection, Advanced Vehicle Safety, Driver Fatigue, Fatigue Warning, Driver safety, advanced road safety, Driver drowsiness, Eye tracking system, Driver performance, Real Time fatigue detection, Driver assistance, Driver monitoring system.*

1.Introduction

The Real Time dangerous behaviors which are related to fatigue whether in form of eye closing, head nodding or the brain activity. Hence we can either measure change in physiological signals, such as brain waves, heart rate and eye Blinking or by measuring physical changes such as aging posture, leaning of river's head and open/closed state of eyes .The previous technique, while more accurate, is not realistic since highly sensitive electrodes would have to be attached directly on the driver's body and hence which can be annoying and distracting to the driver. In addition long time driving would result in perspiration on the sensors, diminishing their ability to monitor accurately. And also in second case instead of eye blink sensors they are using camera, to capture the face, and eyes and using image processing they can decide whether driver is sleep or awake.

2.Flow Chart

This system will detect a driver fatigue by processing of eye region. As shown in flow chart in Fig.1. If eyes are blinking normally no warning is issued but when the eyes are closed for more than half second this system issues warning to the driver in form of alarm and seat belt vibration.

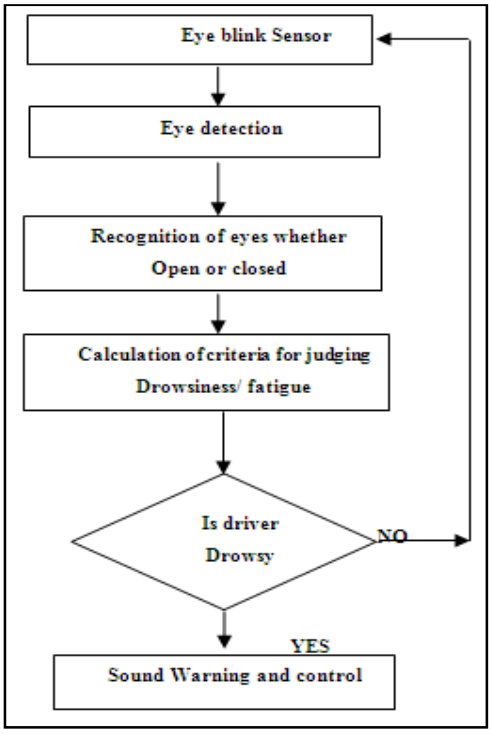

Figure 1 : Flow chart of the system

3.Hardware

3.1.Block Diagram

In this system the eye blink sensors are fixed to the driver, it continuously monitors the eye blink of the driver and data will be transferred to the microcontroller by using signal conditioning circuit, then microcontroller activates and the data will transfer to the control side of the vehicle through RF transmitter and encoder. Encoder converts the parallel information to serial information.

Here the RF receiver receives the information from the eye blink sensor that will be given to the decoder to decode the information and then given to the microcontroller. The obstacle sensor senses the obstacle distance that is given to the controller. It continuously checks the object whether it is movable or immovable. If the object is immovable means the microcontroller reduce the speed step by step using the relay driver circuit and also check the eye blink sensor values.

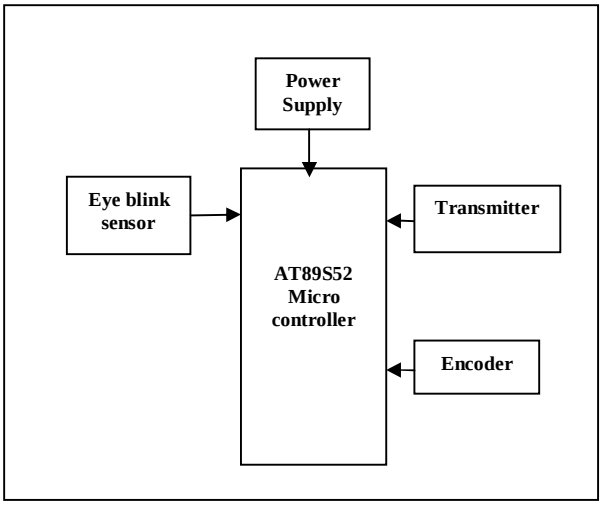

Figure: 2 Block Diagram of Driver Section

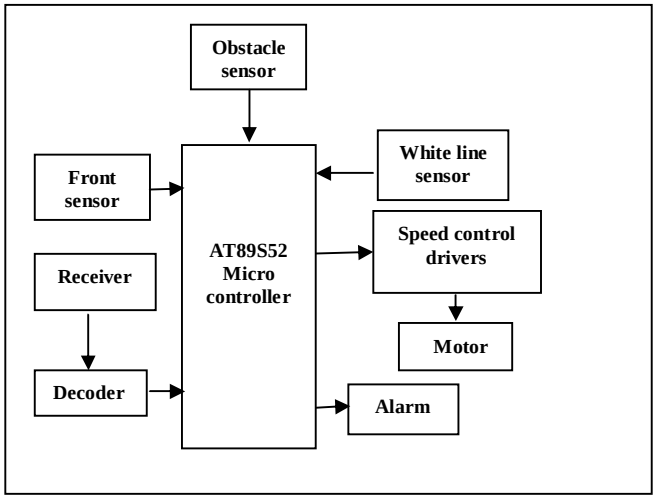

Figure 3: Block Diagram of Control Section

3.2.At89s52 Microcontroller

ATMEL AT89C51 microcontroller is used for the project. It is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory.

Figure 4: AT89S52 Microcontroller

ATMEL AT89S52 microcontroller is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the Industry standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O

lines, watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM con-tents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

3.3.Eye Blink Sensor

In our Project the eye blink sensors are fixed to the driver, it continuously monitors the eye blinks. The eye blinks sensor sense how many times the eye will be blinked and controls the eye blink using 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 means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. If the driver is sleep the sensor give the control signal to the microcontroller then the controller control the vehicle speed through motor driver circuit and then controller automatically take the vehicle left and stop the vehicle.

3.4.Obstacle Sensor

Obstacle sensor is nothing but IR signal it contains transmitter and receiver pairs it continuously emits IR ray by the transmitter when a ray s get reflected and received by the IR receiver it sense there is a obstacle in front of the vehicle it is given to microcontroller by using signal condition unit.

4.Result

The hardware developed “Control of Vehicle when Driver is Fatigue using Sensors” is very advanced product related to driver safety in the roads as this product detects driver drowsiness and gives Warning in form of alarm and vibration in less than one second time which is the major achievement of this project.

5.Conclusion

The experimental result shows the validity of the proposed model for vehicle speed controller under driver fatigue. 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 fatigue by detecting eye blink & head movement was developed using self developed algorithms through research presented, we propose an intelligent car system for accident prevention and making the world a much better and safe place to live.

6.Reference

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