Poster Presentation on "Real time Drowsy Driver Detection"

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Abstract

The Drowsiness Detection System: An Accident Prevention System for Vehicles is a cutting-edge technology designed to enhance road safety and reduce accidents caused by driver fatigue and drowsiness. This system incorporates an advanced eye blink sensor placed near the driver's eye to monitor their blink count. When an abnormal situation, such as prolonged eye closure, is detected, the system triggers an alarm and initiates preventive actions, including applying the brakes and activating a vibrating mechanism in the driver's seat.

This poster presents an overview of the system's key components and functionality, focusing on the sensing technique using IR sensors, the transmitter module that facilitates data transmission, the system's methodology for preventing accidents, and the integration of an alarm module, including a buzzer and light indicators.

Through the implementation of this Drowsiness Detection System, we aim to contribute to a safer and more secure driving experience, ultimately reducing the incidence of accidents caused by driver fatigue and drowsiness.

Introduction

In recent years, the alarming surge in vehicular accidents has raised critical concerns about road safety and the well-being of drivers and passengers. One of the major contributors to these accidents is driver drowsiness. Long hours on the road, monotonous journeys, and extended periods of driving can lead to lapses in driver attentiveness, making it essential to develop effective mechanisms to mitigate this risk.

Our project addresses this pressing issue by introducing a sophisticated Drowsiness Detection System, which serves as a potent accident prevention system for vehicles. At its core, this system relies on an innovative eye blink sensor, strategically placed near the driver's eye, to monitor the frequency and duration of eye blinks. This sensor-based approach is at the forefront of technological advancements in the field of driver safety.

Drowsiness Detection Techniques

SR NO	MEASURES	PARAMETERS	ADVANTAGES	LIMITATIONS
1	SUBJECTIVE	QUESTIONAIRRE	SUBJECTIVE	NOT POSSIBLE IN REAL TIME
2	VEHICLE BASED	-DEVIATION FROM LANE POSITION -WHEEL MOVEMENT	NON INTRUSIVE	UNRELIABLE
3	PHYSIOLOGICAL	ENERGY FEATURES DERIVED FROM ECG ETC	-RELIABLE -ACCURATE	INTRUSIVE
4	BEHAVIORAL	-YAWNING -EYE BLINK -HEAD POSE	-NON INTRUSIVE -EASE OF USE	LIGHTING CONDITIONS

Sensing techniques

From the previous table we can understand why eye blink detection method is used:

- The sensor consists of an IR-LED/Photodiode pair mounted on a pair of glasses
- The value returned by photodiode varies depending on whether the IR light is reflected off the eyelid or the white sclera of the eye.
- This is used to obtain threshold values for the blink detection.

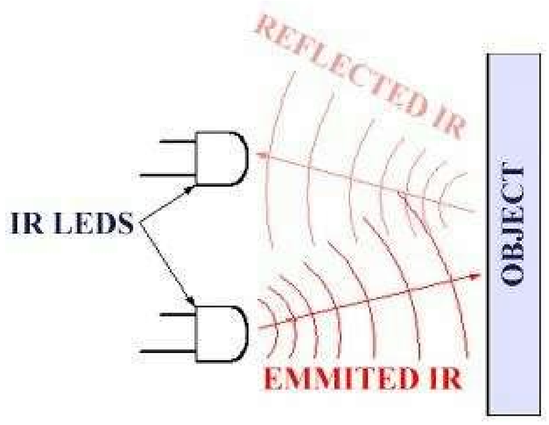

Figure 1. figure 1:IR sensor working

Sensing techniques

Digitalized eye blink:

- Theregulareye blink of a human eye gives a graph like the figure below.
- This is taken as a reference and is repeatedly compared to the real time data being received by the receiverand is compared with a comparator
- The comparatorin the circuit diagram checks for abnormalities

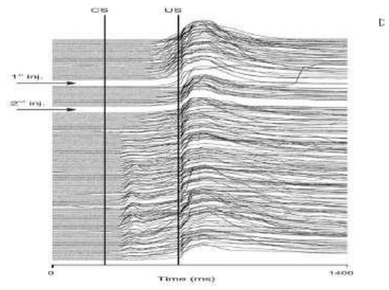

Figure 2. figure 1:IR sensor working

Transmiiter module

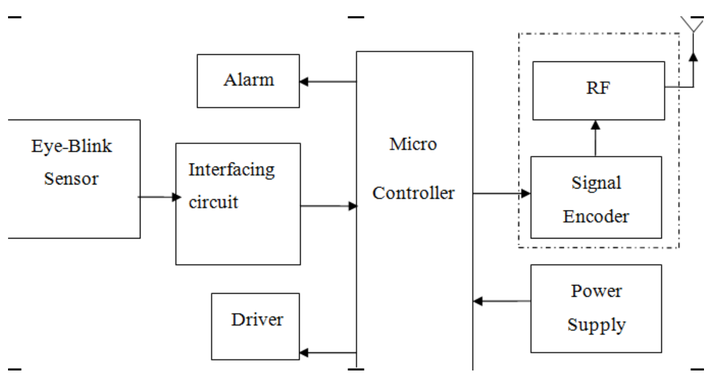

Figure 3. figure 1:IR sensor working

IR MODULE

Infrared transmitter is one type of LED which emits infrared rays generally called as IRTransmitter. Similarly IRReceiver is used to receive the IRrays transmitted by the IRtransmitter. The transmitted signal is given to IR transmitter whenever the signal is high, the IRtransmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator. In the comparator circuit the reference voltage is given to inverting input terminal. Thenon inverting input terminal is connected IRreceiver. When interrupt the IRrays between the IRtransmitter and receiver, the IRreceiver is not conducting. So the comparator non inverting input terminal voltage is higher than the inverting input. Now the comparator outputis in the range of +5V. This voltage is given to microcontroller so led will glow. When IRtransmitter passes the rays to receiver, the IRreceiver is conducting due to that non inverting input voltage is lower than inverting input. Now the comparator output is GNDso the output is given to microcontroller

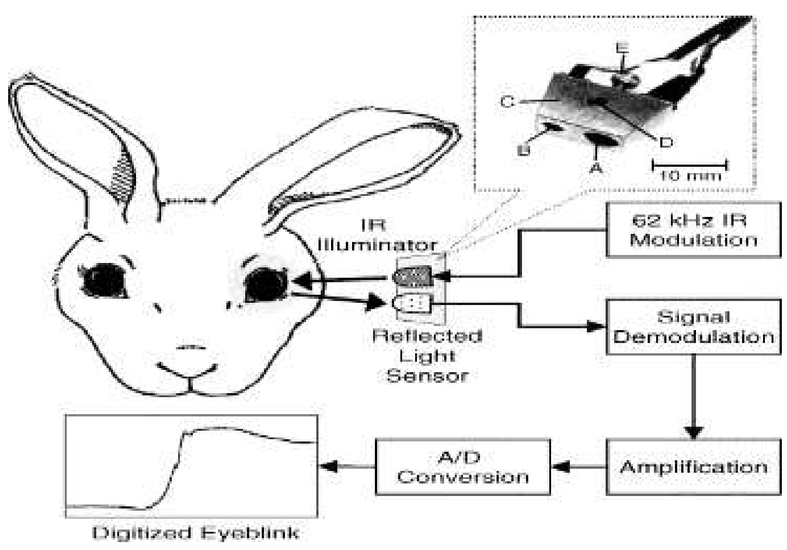

Figure 4. figure 1:IR sensor working

ALARM MODULE

A buzzer or beeper is a signalling device, usually electronic, typically used in the alarm modules. It most commonly consists of a number sensors connected to a control unit that determines the conditions for when the trigger has to go on., The output is given by usually illuminating a light , and sounding a warning in the form of a continuous or intermittent buzzing or beeping sound.

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Methodology

The system works when the driver closes the eyes for around 3 seconds. There is an Infra-red sensor in the system, it senses the eye blink of the driver and when the eye is closed for 3 seconds, the system gives an alarm and also there is a vibrator present at the back of the seat, the vibrator vibrates and the break is also applied gradually. This is how the project works The transformer in the system is 230 V and it converts power to 12V as all the parts in the system needs only 6V to 12V . It is connected to the Microcontroller, Timer circuit, buzzer and the alarm. When the system is on the circuit works and the wheel rotates as the relay circuit is closed .When the driver closes his eyes for around 3 seconds, the IRsensor gives information to the timer circuit it activates the Microcontroller and the microcontroller gives information to the three relays and the relays gets open and the wheel gets stopped, the break is applied and also the vibrator will vibrate and the alarm will be ringing. In the circuit there are capacitor, Resistance, diode and also regulator to control and purify the current flow. Capacitors and regulator are mainly fixed for adequate current flow to the components

Conclusions

In today's fast-paced world, the need for drowsiness detection systems has become increasingly evident, especially in the context of transportation and critical industries. These systems, often employing advanced Digital Image Processing (DIP) techniques, play a pivotal role in identifying and mitigating the risks associated with drowsiness and fatigue.

Drowsiness detection systems are not only a means to prevent accidents, save lives, and enhance productivity but are also a testament to the remarkable strides made in technology and safety. They address the fundamental issue of human limitations in vigilance and attentiveness, providing a proactive solution to a persistent problem.

By integrating techniques such as eye tracking, facial expression analysis, pupil dilation monitoring, and machine learning algorithms, these systems continuously assess a person's state of alertness. They recognize the telltale signs of drowsiness, whether it be through the measurement of blink rate, changes in pupil size, facial expressions, or erratic behaviors. The incorporation of infrared imaging and EEG signals further enhances the ability to detect drowsiness in various environmental conditions.

Moreover, the multimodal nature of these systems, which often combines several techniques, enables a comprehensive evaluation of the individual's state. They not only keep an eye on the driver but also monitor the environment, providing a holistic understanding of the circumstances.

Drowsiness detection systems are a shining example of how technology can be harnessed for the greater good, ultimately saving lives and reducing the economic and emotional toll of accidents. Their role in enhancing transportation safety, workplace security, and overall productivity cannot be overstated.

As technology continues to evolve and our understanding of the importance of alertness deepens, drowsiness detection systems will remain at the forefront of our efforts to create a safer and more efficient world. Their continued development and integration into our daily lives will undoubtedly contribute to a future where drowsiness-related accidents become a rarity rather than a tragic reality. The need for these systems is clear, and their impact on safety and productivity is immeasurable.

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Figure5:footprintsofvarious modules