Poster Presentation on "Real time Drowsy Driver Detection"

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Abstract

The Drowsiness Detection System enhances road safety by monitoring the driver's blink count using an advanced sensor near their eye. When it detects prolonged eye closure, it triggers an alarm, applies brakes, and activates a vibrating seat mechanism. This poster outlines the system's key components: IR sensors, a data transmission module, accident prevention methodology, and an alarm system. Our goal is to improve driving safety and reduce fatigue-related accidents.

Introduction

Nowadays accidents are increasing at a large pace, and various technologies are being introduced to reduce the accidents. This project provides a means of accident prevention using eye blink sensor wherein the vehicle is stopped immediately and intimated wherever needed. This project uses eye blink sensor, which 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 Microcontroller. The Microcontroller 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 alarm indication

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.

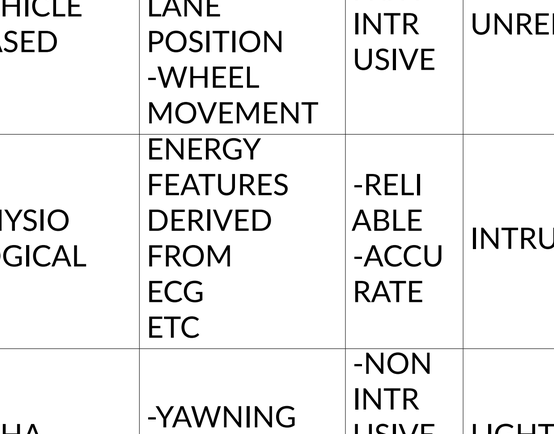

Figure 1. IR sensor working

- 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.
- This data is given to the comparatorto compare and execute the furtherfunctions

Sensing techniques

Digitalized eye blink:

- Theregular eye 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 receiver and is compared with a comparator
- The comparator in the circuit diagram checks for abnormalities

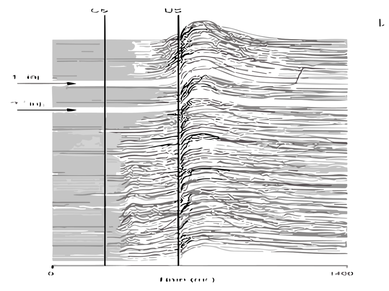

Figure 2. Digitalized eye blink

Transmiiter module

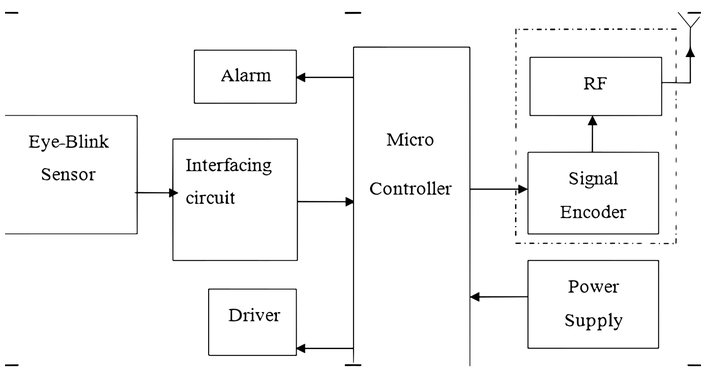

Figure 3. Transmitter module

IR MODULE

An IR transmitter emits infrared rays, and an IR receiver receives them. When the IR transmitter's signal is high, it conducts, allowing IR rays to reach the receiver. The IR receiver is connected to a comparator circuit with a reference voltage at the inverting input and the IR receiver's output at the non-inverting input. When IR rays interrupt the transmitter-receiver connection, the IR receiver doesn't conduct, making the non-inverting input voltage higher than the inverting input. The comparator output is +5V, which lights up an LED connected to a microcontroller.

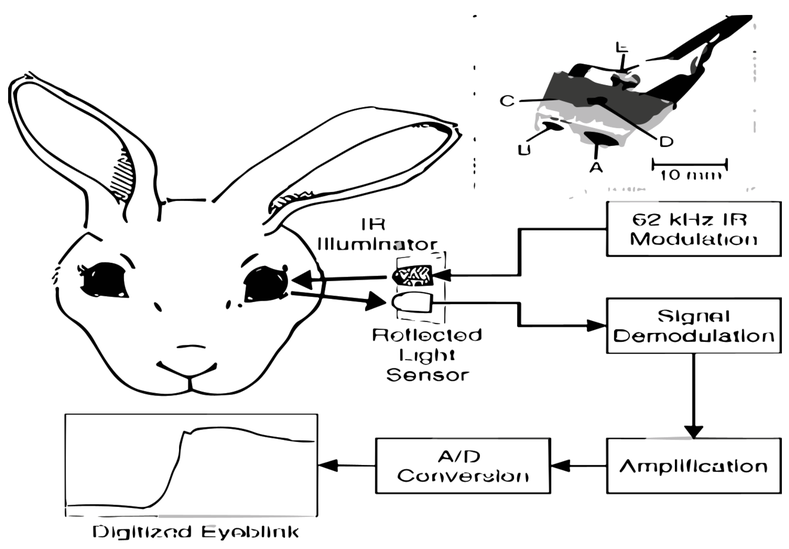

Figure 4. IR sensing module

ALARM MODULE

A buzzer or beeper is an electronic signaling device typically used in various applications, including alarm modules, and it typically consists of sensors connected to a control unit that determines when the buzzer should be activated.

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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

Drowsiness detection systems, driven by advanced Digital Image Processing (DIP) techniques, are vital in preventing accidents and enhancing safety, particularly in transportation and critical industries. They tackle human limitations in vigilance by continuously assessing alertness through methods like eye tracking, facial expression analysis, pupil monitoring, and machine learning. These systems, often combining multiple techniques, provide a holistic evaluation of an individual's state and monitor the surrounding environment. They play a pivotal role in saving lives, reducing accidents, and boosting productivity, highlighting the positive impact of technology on safety. As technology evolves and our awareness of alertness grows, drowsiness detection systems will continue to improve safety and efficiency, making drowsiness-related accidents a rare occurrence. Their need and impact on safety and productivity are undeniable.

Limitation

Faulty operations:

- the driver is wearing glasses
- he driver's IR-reflecting objects such as earring

Drowsiness usually happen during the evening/night hours:

- Light poles might be recognized as eye candidates due to the shape and size on screen.

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