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Development and Fabrication of Modified Eye Blinking Vehicle Accident Avoiding System

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Abstract: ***The Eye Blinking Car Accident Avoiding System (EBCAAS) is a novel approach to enhance driving safety by detecting and preventing accidents caused by driver drowsiness or distraction. The system uses a camera mounted on the dashboard of the vehicle to continuously monitor the driver's eyes and detect any abnormal blinking patterns that may indicate fatigue or distraction. Upon detection of such patterns, the system sends an alert to the driver in the form of visual or audio cues, reminding them to stay alert and focused on the road. Additionally, the system is equipped with an automatic emergency braking mechanism that can be activated in the event of a potential collision. The EBCAAS has the potential to significantly reduce the incidence of accidents caused by driver fatigue or distraction and improve road safety for all users. Accidents due to drowsiness can be controlled and prevented with the help of eye blink sensor using IR rays. It consists of IR transmitter and an IR receiver. The transmitter transmits IR rays into the eye. If the eye is shut, then the output is high. If the eye is open, then the output is low. This output is interfaced with an alarm inside and outside the vehicle... The alarm inside the vehicle will go on for a period of time until the driver is back to his senses. Analysis of the data revealed that eye blink duration and eye blink frequency were important parameters in detecting drowsiness. From these measured parameters, a continuous measure of drowsiness, the New Drowsiness Scale (NDS), is derived. The NDS ranges from one to ten, where a decrease in NDS corresponds to an increase in drowsiness. Based upon previous research into the effects of drowsiness on driving performance, measures relating to the lateral placement of the vehicle within the lane are of particular interest in this study. Standard deviations of average deviations were measured continuously throughout the study. The NDS scale, based upon the gradient of the linear regression of standard deviation of average blink frequency and duration, is demonstrated as a reliable method for identifying the development of drowsiness in drivers. Deterioration of driver performance (reflected by increasingly severe lane deviation) is correlated with a decreasing NDS score. The final experimental results show the validity of the proposed model for driver drowsiness detection.***

I. INTRODUCTION

Vehicle accidents are most common if the driving is inadequate, these happen mostly on the factor of drowsy. Driver sleepiness is recognized as a very important think about vehicle accidents. Vehicle accidents are most common if the driving is inadequate, these happen mostly on the factor of drowsy. Driver sleepiness is recognized as a very important think about vehicle accidents. We can't watch out of ours whereas in running by less acutely aware. If we tend to done all the vehicles with automatic security system that has high security to driver, conjointly offers alarm. All vehicles should be equipped with eye blink sensor in future avoids these types of accidents Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the motive force is drowsy. Driver sleepiness is recognized as a very important think about the vehicle accidents. Advanced technology offers some hope avoid the up to some extent. Most of the road accidents are occurring due to tiredness of the driver because of continuous driving for hours and hours. To eradicate this a system is designed. This system is used for the safety of automobiles and people. Drowsiness is one of the main reason for this accidents. If the driver falls sleep or if he is drowsy he will lose control on his vehicle by putting his life and others life in a risk. The main cause of this drowsiness is taking some medicines while driving car, which may lead to fall sleep. This project involves live and controls the attention blink mistreatment IR sensing element. The IR transmitter is employed to transmit the infrared rays in our eye. The IR receiver is employed to receive the mirrored infrared rays of eye. If the attention is closed means that the output of IR receiver is high otherwise the IR receiver output is low. This to grasp the attention is closing or gap Position. This output is provide to logic circuit to point the alarm. This project involves dominant accident thanks to unconscious through nictitating. A from PIC and other necessary elements as per our design requirement results as output. As chip styles get quicker, the cost of manufacturing a chip (with smaller components built on a semiconductor chip the same size) generally stays the same. Before microprocessors, small computers had been implemented using racks of circuit boards with many medium and small-scale integrated circuits.

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Microprocessors integrated this into one or some large-scale ICs Continued will increase in chip capability have since rendered alternative varieties of computers nearly fully obsolete with one or a lot of microprocessors utilized in everything from the littlest embedded systems and Handheld devices to the largest mainframes and supercomputers.

II. SYSTEM DESCRIPTION

Embedded system devices are an important part of daily life. These are a combination of hardware and software, in which software is commonly known as hardware embedded software. One of the most important features of these systems is that they provide o/p within time limits. So we often use embedded systems on simple and sophisticated devices as well. In many devices like microwave, calculators, TV remote control, home security and crowded control systems, embedded system applications are very much involved in our real life. Embedded system block diagram is shown in Fig 1. Embedded devices are widely divided into several categories, depending on the hardware and software and the microcontroller "8 or 16 or 32-bit"

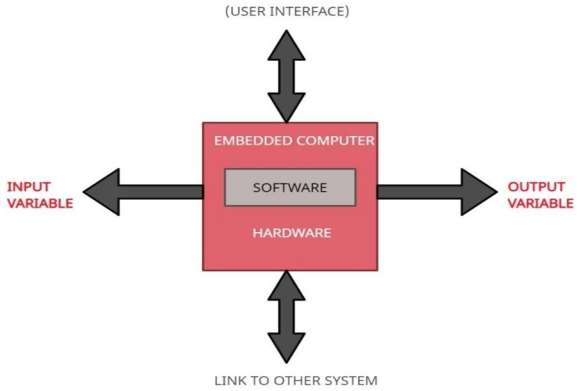


Figure 1: Embedded Systems block diagram

Airbags are currently a variety of features found in cars that are useful for car safety and security. In particular, these vehicles have been standard front airbags since 1998. This function aims that when the driver is sleepy, a buzzer signal in the system is provided, which reduces the driver's speed. The marketable design will gradually decreased the speed of vehicle with the help of breaks and will alert the driver with the buzzer going on.

III. SYSTEM DESIGN IMPLEMENTATION

System block diagram is comprise of: Eye blink (IR): related to sleep detection and alert the driver with the components used in the proposed operation are Eye blink length and frequency, Power supply, Buzzer, LED ARDUINO (UNO), Relay Module, DC as shown in Figure 2. The main component is Arduino Uno which is an ATmega328 based microcontroller (MC) that performs all functions related to controlling the embedded system circuit. The blinking module works by illuminating the eye area with infrared light, and then detecting changes in scattered light using an image transistor and a separation circuit. Each of the components is described below.

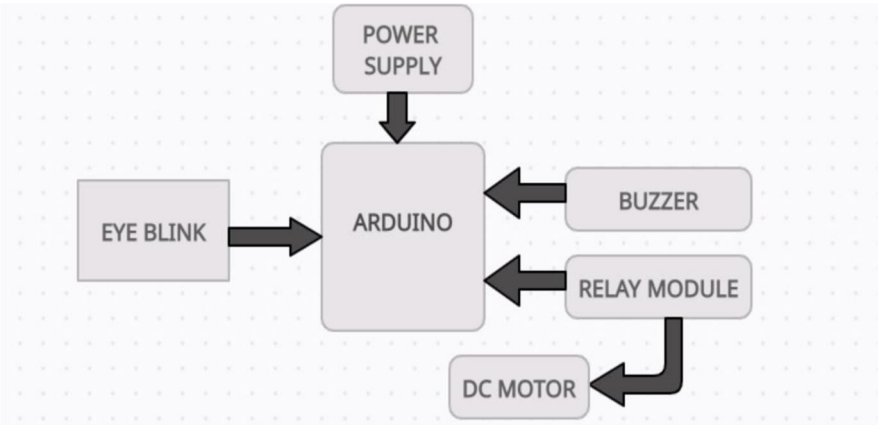


Figure 2: Schematic Block Diagram

A. 8051 Microcontroller

8051 microcontroller is designed by Intel in1981. It is an 8-bit microcontroller. It is built with 40 pins DIP (Dual inline package), 4kb of ROM storage and 128 bytes of RAM storage, 2 16-bit timers. It consists of four parallel 8-bit ports, which are programming as well as addressable as per the requirements. An on-chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12 MHz . Overall the microcontroller 8051 has been a popular choice for many embedded systems applications due to its simple architecture, low cost, and wide availability of development tools.

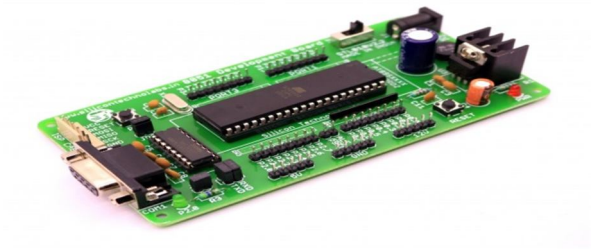


Figure 3: 8051 Microcontroller

B. Eye Blink Sensor

Using a phototransistor and a separator circuit, the blink sensor illuminates the eye area and eyelid with infrared light and detects changes in the reflected light. This study includes measuring and monitoring the blink of an eye with the help of an IR sensor. Closed eye indicates that the output of the IR receiver is high except that the output from the IR receiver is low. These sensors are typically used in combination with mathematical models and algorithms such as signal processing, machine learning, and statistical modeling to analyze and interpret the data obtained from the sensors. Overall, eye blinking sensors are a valuable tool in improving driver safety by detecting and warning of drowsiness and distraction. Figure 4 shows an instant blink sensor with an IR attached to it.



Figure 4: Eye Blink Sensor

C. Buzzer

The "Piezoelectric Sound Modules" presented here work on the concept of conversion using natural piezoelectric ceramic oscillation. These buzzers are available in lightweight, portable sizes ranging from a small diameter of 12 mm to large electrical outlets from peizo. The one shown in fig 6 below is a simple word that when enabled makes a continuous beep. To alert the driver when he first falls sleepy, the buzzer will be connected to the Eye-Blink



Figure 5: Buzzer

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D. LED

LED is a semiconductor light source. LED is a separate diode form and has certain electrical features of the PN junction diode. The LED therefore allows the current to flow forward and blocks the energy flowing in the opposite direction. The LED takes up less than 1 mm in the field. LED technology used to perform various electrical and computer function. Silicon TechnoLabs LCD 16x2 Alphanumeric Display (JHD162A) for 8051.

IV. SOFTWARE REQUIREMENTS

Jupyter notebook IDE: The open-source jupyter notebook (IDE) makes it easy to write code and upload it to the board. It operates on Windows, Mac OS X, and Linux. The environment is written in python and based on Processing and other open-source software. This is where you can type the code you want to compile and send to the microcontroller 8051 board. The initial setup: We need to setup the environment to the Tools menu and select Board Then select the type of microcontroller you want to program. The code you write for your 8051 are known as sketches. They are written in python.

V. MATHEMATICS

Some basic mathematical analysis was necessary for some calculations and optimization requirements. We have made some assumptions for the preliminary mathematical analysis. They are as follows:

1) We assume that the Driver is not wearing an Reflectors/Spectacles/Contact Lenses.

2) We assume that the ambient light doesn't effect the Eye-Blink Sensor.

Now, we will set the variables of our model.

Let the rate at which the eye blinks be = m blinks/minute.

Let the rate at which the CNY70 sensor sends the IR signal be = n pulses/second. Let the distance between the Vehicle and other vehicle at the front be = d meters.

Let the voltage output of the CNY70 be = R (when eye open). = C (when eye close).

Let the voltage output of QRD114 be = S (when the vehicle maintains a safe distance). = U (when the vehicle is not maintain a safe distance).

Let the voltage of the Microcontroller to the Buzzer = A (Eye open OR Safe Distance). = B (Otherwise). Now, A = f (R, S, m, d). [considering n to be a constant pulse]. ---------- (1).

Till the time the number of blinks per minute is not more than 16 [6].

The value of R will always be on, that means, the buzzer won't go ON. Similar is for the distance sensor.

Therefore, the output voltages are a function of the eye blink rate and the distance between the vehicle.

Thus, m = g (R,C) [note that m has two states] --------(2).

d = h (S,U) [note that d also have two states] --(3).

Now, equation (1) reduces to : A = f(m, d) ----------(4).

Again, we should also consider the fact that both m and d should independently trigger the microcontroller. Both the sets are completely disjoint. Thus, equation (4) can be written as, A = f(m) + f(d) + f(m,d) + f(d,m) [keeping in mind an arbitrary precedence of output signals]---(5).

VI. CODE

```
import RPi.GPIO as GPIO
import time
# Set up GPIO pins
GPIO.setmode(GPIO.BOARD)
GPIO.setup(11, GPIO.IN)  # IR sensor input
GPIO.setup(13, GPIO.OUT)  # Alarm output

# Blink detection threshold (adjust to your preference)
BLINK_THRESHOLD = 0.5  # in seconds

# Main loop
while True:
    if GPIO.input(11) == GPIO.LOW:
```

```
    # Eyes are closed
    start_time = time.time()
    while GPIO.input(11) == GPIO.LOW:
        time.sleep(0.01)
    end_time = time.time()
    blink_duration = end_time - start_time
    if blink_duration > BLINK_THRESHOLD:
        # Blink duration is longer than threshold, trigger alarm
        GPIO.output(13, GPIO.HIGH)
        time.sleep(0.5)
        GPIO.output(13, GPIO.LOW)
else:
    # Eyes are open
            time.sleep(0.01)
```

This code assumes that the IR sensor is connected to GPIO pin 11 and the alarm is connected to GPIO pin 13. You'll need to adjust these values if your hardware is different. The code also uses a simple threshold value of 0.5 seconds for the blink duration, but you may want to experiment with different values to find the best setting for your use case.

Our investigation showed that different elliptic circles were formed for strolling, climbing, venturing into a place, and moving back by utilising the cyclic movement of the linkage center. The purpose of this paper is to contemplate about the Theo-Jansen eight leg strolling robot.

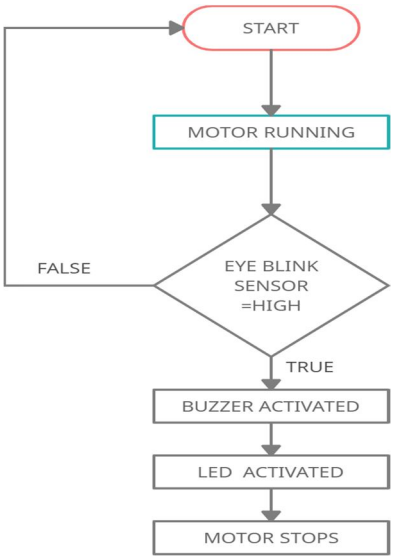
VII. DESIGN ANALYSIS

The system works with the goal of the eye twitch sensor that receives the driver's sleep. This effect is given to the buzzer. The rotation speed is reduced when the driver is sleep, while on the other hand the blink sensor receives the sensor stops the wheel. This program offers a new way to stop drowsy men. The device has an installed blink sensor. Once the driver has started the engine, the sensors automatically detect the blink of an eye and check the his or her breath. On this device the sensor output is given to compare with 8051. If the value exceeds the limit when the buzzer automatically generates vibration, the LED glows and the car stops automatically.

A. Procedural Steps for Implementation

1) Connect eye Blink sensor to 8051 pin D0 illustrated in fig 8.

2) Connect Buzzer to 8051 pin D13.



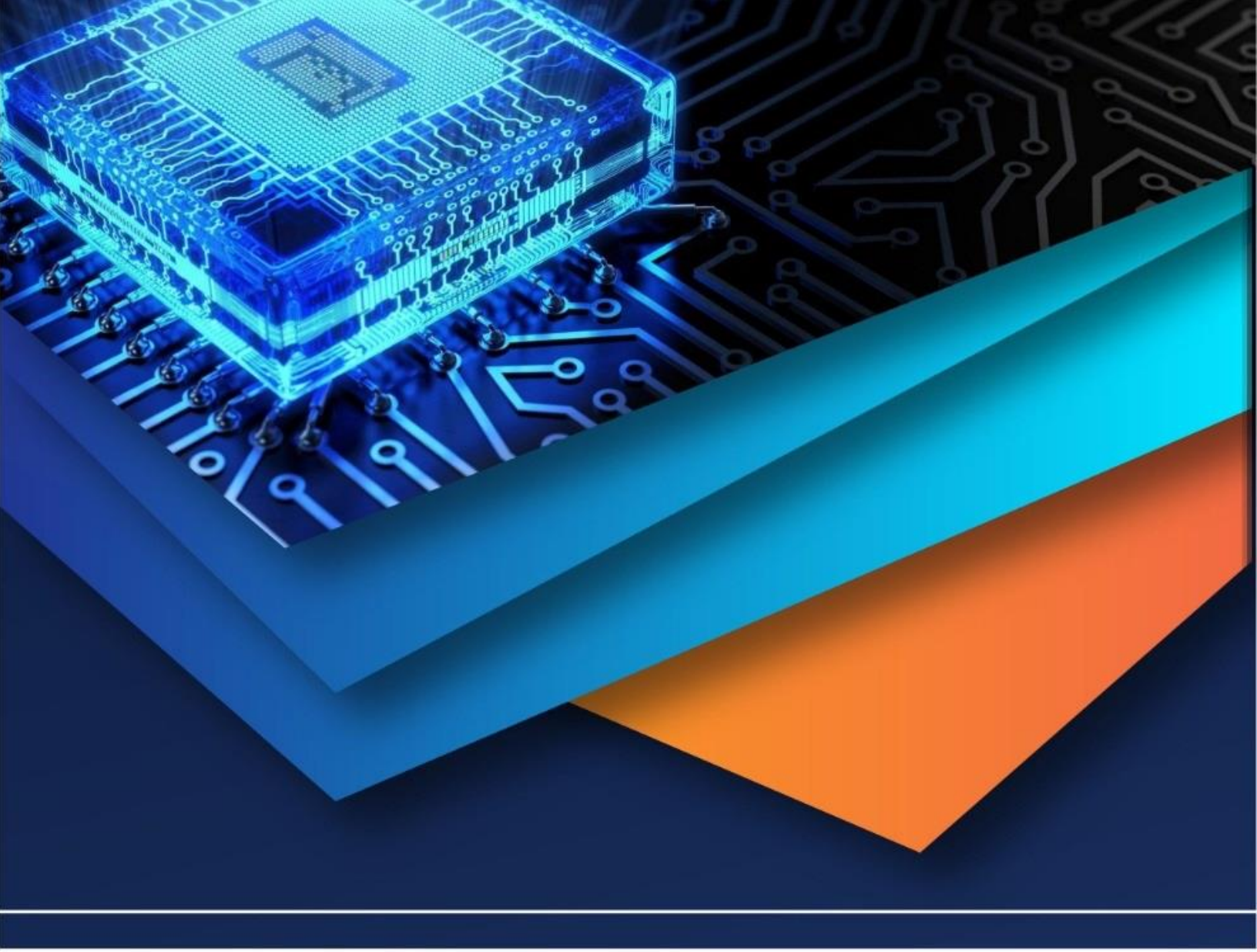
VIII. CONCLUSION

People are increasingly exposed to dangers today. Therefore, we need to take action against this as an engineer and have the solution we need. Any automation is designed to protect a person. Such a model is tasked with developing a system for diagnosing and controlling the speed of vehicles to prevent accidents. To some extent, modern technology offers some hope of stopping these. This paper includes monitoring the blink of an eye with the help of an IR sensor. On this device the output of the sensor is provided for comparison with ARDUINO. When the value reaches the set level, the buzzer automatically vibrates, the LED glows, and the car stops automatically when the eye blink sensor receives a signal from the transmission component

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