

Drowsiness Detection System

Nirmal Sunil
UG Student

Department of Mechanical Engineering
Dharmsinh Desai University,
Nadiad, Gujarat, India

Anmol B. Jain
UG Student

Department of Mechanical Engineering
Dharmsinh Desai University,
Nadiad, Gujarat, India

Meet R. Bhavsar
UG Student

Department of Mechanical Engineering
Dharmsinh Desai University,
Nadiad, Gujarat, India

Abstract—With the rapid development of science and technology, automotive technology has witnessed an exponential growth which was followed by taking the comfort and safety of driver and passenger as a primary aspect of the motor vehicle.

Improving vehicle safety is a key strategy used in addressing international and national road casualty reduction targets and in achieving safer road traffic comprises measures to help avoid a crash (crash avoidance) or reduce injury in the event of a crash (crash protection). Road traffic injuries are a major but neglected global public health problem, requiring concerted efforts for effective and sustainable prevention. Of all the systems that people have to deal with on a daily basis, road transport is the most complex and the most dangerous. Worldwide, the number of people killed in road traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million – the combined population of five of the world's large cities. What is worse, without increased efforts and new initiatives, the total number of road traffic deaths worldwide and injuries is forecast to rise by some 65% between 2000 and 2020, and in low-income and middle-income countries, deaths are expected to increase by as much as 80%. This project deals with Drowsiness Detection System.

Keywords—Drowsiness Detection System, Motor Vehicle Safety

INTRODUCTION

There is a lot of importance of comfort and ease while travelling. The comfort of a vehicle refers to the level of safety offered from different kinds of situations and factors especially like road safety. The most comfortable and luxury cars have a high standard of ride quality. A car with very good ride quality is also a comfortable car to ride in.

The comfort of any vehicle is also very important for car safety. The driver feels more comfortable and stress-free in a comfortable car. The more the car is comfortable and of high quality, the more will be control of the car and then in this way less the road disturbance can impact the driver's ability to control the vehicle.

This project deals with our vehicular safety feature-Drowsiness Detection System. It is a vehicle safety technology, which helps to avoid accidents, caused due to

the driver being dozy. The extended hours of driving lead to fatigue and drowsiness. The paper is intended to design an automated system that studies the blinking of the eye. The system is designed such that it will precisely scrutinize the blinking of the driver's eyes.

I. DESCRIPTION

Drowsiness Detection System is a vehicle safety technology, which helps to avoid accidents, caused due to the driver being dozy. A variety of studies have recommended that around 20% of all road accidents are due to the drowsiness of the driver. The developments of technologies for detecting or preventing drowsiness while driving is a major confront in accident evasion systems. Because of the peril of the tiredness, while driving, different new methods need to be developed for counteracting the effect. The paper is based on an example for detection of drowsiness systems. The intent of this paper is the design of an automated system for the safety of a driver. The system is designed such that it will precisely scrutinize the blinking of the driver's eye.

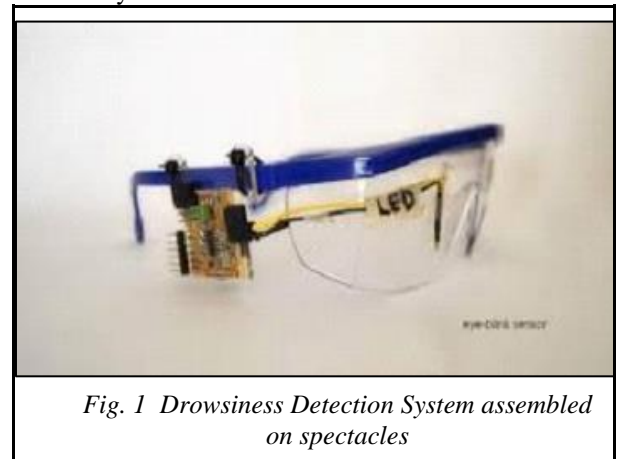


Fig. 1 Drowsiness Detection System assembled on spectacles

II. HARDWARE REQUIREMENTS

A. MICROCONTROLLER ATmega328

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack and works with a Mini-B USB cable instead of a standard one.

B. BUZZER

A buzzer is a small yet efficient component to add sound features to our project/system. It is a very small and compact 2-pin structure hence can be easily used on a breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

There are two types of buzzers that are commonly available. The one shown here is a simple buzzer which when powered will make a Continuous Beeeeeeppp.... sound, the other type is called a readymade buzzer which will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But, the one shown here is most widely used because it can be customised with the help of other circuits to fit easily in our application. This buzzer can be used by simply powering it using a DC power supply ranging from 3V to 5V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at the required time and require interval.

C. INFRARED SENSOR MODULE

IR sensor modules are little microchips with a photocell that are tuned to listen to infrared light. They are almost always used for remote control detection- every TV and DVD player has one of these in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR light is not visible to the human eye, which means it takes a little more work to test setup.

D. SPECTACLES

A light weight glass or plastic frame is used to hold all the components connected to it in position. The frame must have sufficient strength to hold all the electrical components in position. Like a common spectacle, it will be supported at its arms by the ears. A small hole is drilled into one of the eyepieces of the spectacles, to accommodate the infrared sensor into it.

E. POWER SUPPLY

The input to the circuit is from the regulated DC power supply of 9 volts used to power the microcontroller, infrared sensor and the buzzer module.

III. CIRCUIT DIAGRAM

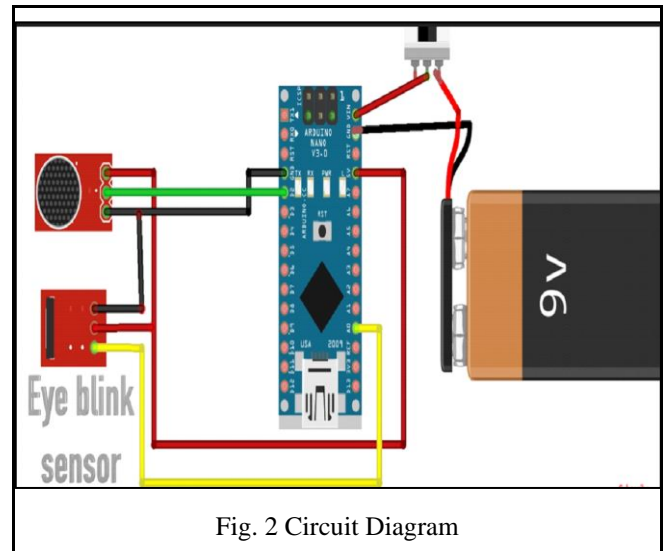


Fig. 2 Circuit Diagram

IV. WORKING

The eye blink of the driver is detected by using an eye blink sensor which is IR based. The disparity across the eye will vary as per eye blink. The output is high if the eye is closed or else output is low. It indicates the closing or opening position of an eye. The IR output is given to the circuit to signify the alarm. The controller will send a warning signal so that it is displayed on the liquid crystal display screen. The buzzer, which is placed near the driver, will be activated and alerts the driver when he falls asleep during driving. According to the intensity of light, the lights will be ON or OFF inside the vehicle, this saves power consumption.

V. APPLICATION

The drowsiness detection system can be used for different applications. One of them is heavy-duty vehicles like buses, cranes and trucks. It can be used for bus and truck drivers, who have prolonged periods of driving. It can be used for drivers of public transport vehicles to ensure the safety of the passengers. The operator of heavy load lifting vehicles like cranes can use this system to avoid accidents at the worksite.

VI. CONCLUSION

As a team, we have successfully assembled the system, coded the microcontroller Arduino NANO in the software Integrated Development Environment. The system has analyzed and the eye blink motions have been studied and was precisely detected by the sensors.

In this paper, the discussion regarding the avoidance of accidents due to drowsiness is discussed with eye blink and the corresponding system was developed. The project has been successfully tested. The project can be further taken to a new level by integrating Artificial Intelligence with it, to study the sleep pattern of humans and to study the motion and dilation of the eye pupil.

ACKNOWLEDGEMENT

We hereby, concluding this project, would like to express our gratitude to our head of department Dr G. D. Bassan for giving us the opportunity to carry out a thesis of our choice and our Prof. Mahavirsinh M. Chavda for providing required guidance, and his valuable and constructive suggestions during our project work. Also, his willingness to give his time is greatly appreciated.

The Faculty of Technology of Dharmsinh Desai University- Nadiad, Gujarat has provided us with the knowledge and assistance that constructed the foundation required in us to initiate and follow through a project such as this, and for that, we are grateful to all the teachers, officers, and staff of the Mechanical Engineering Department.

We would also like to thank our friends for their timely help and suggestions. Their suggestions and comments had really given us a new direction to think on the project.

Finally, we would like to express our gratefulness towards our parents and Almighty for being there with us through thick and thin.

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