International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 05 | May - 2021 ISSN: 2582-3930

Driver Fatigueness Detection System using Arduino.

Dr. N. Jayanthi[1], Saloni[2], Srishti[3], Shweta[4]

[1]*Assistant Professor, ECE, Delhi Technological University*
[2] *Student, ECE, Delhi Technological University*
[3] *Student, ECE, Delhi Technological University*
[4] *Student, ECE, Delhi Technological University*

Abstract - The purpose of this project is to give a solution to reduce road accidents that happen because of drowsiness. After many surveys, professionals found that most of the accidents happens because of continuous restless driving and without taking a break which came in drowsy state due to sleepiness, they can't focus on driving which is risky for driver and another person too. This project will help to observe the driver's eyes and head nodding feature which can detect driver eyes movement and head nodding and we will detect the driver drowsy state with the help of glasses and cap that driver supposed to wear and which is capable to detect the driver's eye blinking by a single scalar quantity EAR (eyes aspect ratio) and IR sensor, we recognize eye movements and by 3 axis accelerometer we can detect the head orientations which will cover nodding like factors and distinguish for every movement with the help of the cap that driver supposed to wear. By this, we will recognize the driver is in the condition of driving or not. If the system detects the driver is in a drowsy state it will give an alert by a continuous alarm sound and displaying message so driver and passengers both can alert so it can reduce accidents on road and help to save a life..

Key Words: Eye blink sensor, Head nodding sensor, IR sensor, 3 axis linear accelerometer, Arduino

1. INTRODUCTION

Instantaneous Time Drowsiness carriage that is comparable to heaviness is in the form of eye shutting, head movement or the brain ventures. Accordingly, we can either compute variation in bodily signals, such as pulse rate, heart rate and blinking of an optic to detect the drowsiness or conside corporal changes such as bowing position, placing of driver's headline and unsealed/sealed status of eyes. The purpose of our outline (Driver Drowsiness Detection System) is a vehicle security technology which serves to protect the life of a driver by obstructing roadway disasters whenever the driver is feeling dozy. Firstly, we have created a scheme for the driver's drowsiness phase discover by continuously observing the driver's eyes. Next, we must design a system that recognizes the drowsiness event by watching the driver's head (when the driver nods). The system is also useful in various illumination conditions. The system is providing alert to the driver on the drowsiness state through the siren. Our motivation is to reduce car accidents which are increasing day by day because the driver keeps sleeping while driving the car and this causes major accidents on road. Many times, a car can even crash 10 cars in a queue, so to stop this we have built a system that detects driver drowsiness state. Around a hundred thousand accident occurred due to the driver's drowsiness state. All results are provided by the national highway police. According to the survey, almost 1550 death and 71000 wounds. It is difficult to find how many accidents occurred in the drowsy state. We have implemented a system that provides an alert signal to the driver that will help to reduce the chances of an accident. Our system detects the blinking of the eye, oversleep of person and head nodding.

2. LITERATURE SURVEY

We already have many ways for detecting the fatigue ness of the driver. This is an important topic due to high security for driver and passenger also. In previous research, we generally had two approaches. Machine learning approach and Hardware approach.

In the Machine Learning approach where a method that used "Haar feature-based cascade classifiers". for detecting face, the major drawbacks for that algorithm are, we need to train the model with a huge number of positive images (with face) and negative images (without a face) also so it can detect the objects but if the object will slightly change so this is unable to detect and give us the unwanted output. For exploited the image for face region recognition we use Adaboost classifier, Haar feature-based classifiers make restitution of images with the segment for fetching the images in small rectangle areas at any place and scaling with indigenous images. Because of different facial physiognomy, this is well-organized real-time face detection. So, we can calculate with the help of the difference of the pixel sum which is present under the rectangle areas when the Adaboost algorithm is processing will consider face samples and discard without face sample images. In Hardware Approach it is been using a camera for detecting eye blinking which is fitted on the glasses, which make it quite expensive, and we had to use Raspberry Pi 3 Model B and Raspberry Pi 8 Mega Pixel camera sensor but in this, we still had to use machine learning technique, so the problem remains same even cost increased as compared to previous one.

3. TYPES OF METHODOLOGIES:

3.1. Intrusive Methodology:

The Intrusive methodology involves physical approach where an electrical conductor is used to acquire palpitation (pulse rate), vital sign (heart rate) and brain venture particulars. Several machines are required to calculate these parameters like ECG

(electrocardiogram) is used to calculate the changes in vital sign and identify distinct conditions for sleepiness. There are many more appliances like EEG (electroencephalogram), and EMG (electromyogram) which are used to calculate if the person is drowsy or not.

3.2. Non-Intrusive Methodology:

The Non-Intrusive methodology involves the behavioral approach where the originality of visual particulars can include features of the face like chin, nose figure, lip lines, smile lines, lid tightener, yawn, eye rotation (identifying both eye movement as the percentage of eye closing, dizzying and the gaze) and the head rotation of a person is identified by a sensor and the person is notified if any of these sleepless symptoms are identified.

4. OTHER METHODS:

Incorporating the sensor anywhere in the car, thus the sensor observes the eye maneuver of the driver more frequently. If the palpebra of the driver is not visualizing any transition for a while, attention will be given to the driver. This locater should be affixed thusly it might visualize the eye maneuver whenever the driver does it.

4.1. Eye Blink Sensor

In this project, we have used the IR transmitter and receiver in the eye blinking sensor which is enclosed in glasses that the driver is supposed to wear. It is a contemplative sensor that encompasses an infrared emitter and phototransistor in a lead combination that obstructs the visible light. One primitive foundation is that the IR transmitter and receiver should be in the same line for the best efficiency. The transmitter transmits IR rays to the eye of the driver through the glasses that the driver is supposed to wear. Reckoning on regarding the eye is closed or open, there will be foremost output for a shuteye and small output for a normal eye. The transmitted signal is encapsulated by the IR receiver. This receiver is connected to the Arduino. When the IR transmitter passes the rays to the receiver, the receiver is conducting. So, the output is given to the Arduino.

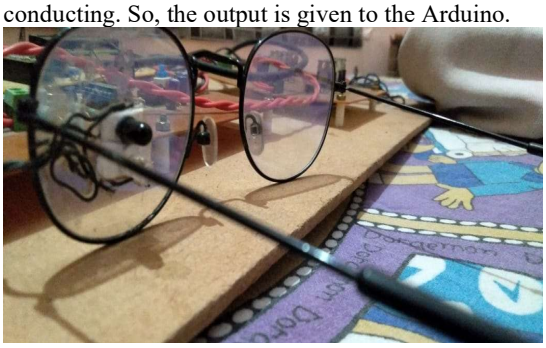


Fig: -1: Eye Blink Sensor

4.2. IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Hershel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

Fig: -2: IR Sensor

4.3. Head Nodding Sensor

In this project, we have used the 3-axis linear accelerometer enclosed in a cap that the driver is supposed to wear. By computing and evaluating the aggregate proportion of acceleration due to gravity, an accelerometer can resolve the angle, it is bent at with respect to the ground. By recognizing the proportion of dynamic acceleration, the accelerometer can answer that in what direction the device (which is the cap in our project) is moving. The output is sent to Arduino which then perform and send the output as an LCD display and LED lights for caution.

Fig: -3: Head Nodding Sensor

4.4 3 axis linear accelerometer

3 Axis Linear Accelerometer is an Ultra high purpose and low noise accelerometer. 3 Axis Linear Accelerometer has a full scale of ±2.5g and can provide the measured accelerations to the application through an SPI 4-wire digital interface. 3 Axis Linear Accelerometer is a sensing element which is assembled using an assign micromachining process

assembled by STMicroelectronics to provide inertial sensors and actuators on silicon wafers. The IC interface is manufactured using a CMOS process that allows a high level of integration to design a dedicated circuit, which is trimmed to better match the characteristics of the sensing element. The 3 Axis Linear Accelerometer's operating temperature value is -40-degree Celsius to 85 degree Celsius. 3 Axis Linear Accelerometer can do high-performance and able to provide low stress.

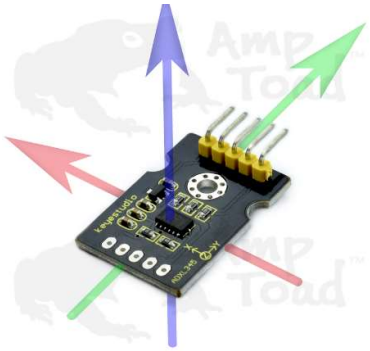
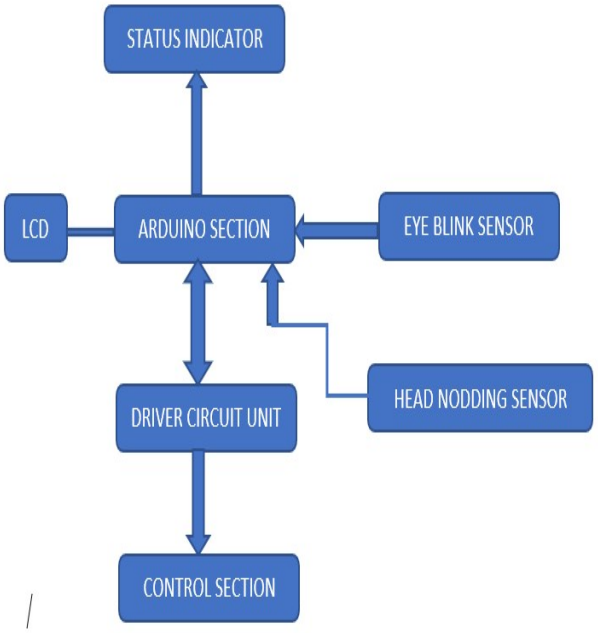


Fig: -4: 3 axis linear accelerometer

5. BLOCK DIAGRAM



6. IMPLEMENTATION:

In our project, we are using Arduino UNO which is an Open-source electronic prototyping platform that helps users for making creative innovations in the electronics stream. Arduino is easily affordable in the market with reasonable cost as compared to Raspberry Pi. We are using IR Sensor for eye blinking detection where we fix IR Sensor's both transmitter and receiver.

The IR transmitter is used for catching the infrared signal from human eyes and the receiver catches the reflected infrared signal from human eyes. If the eye is closed, then the receiver is not able to detect the reflected signal so we can see a clear message on 7 segment display that "Driver's eyes are closed" and for setting the sensitivity we are using potentiometer so if there is any problem so user can also tune it.

In our second feature which is head-nodding, we are using a 3-axis linear accelerometer which is also trained with the help of Arduino. This is a small circuit so we can fix it on the cap so if the driver wears this cap and if his head nodes, then 7 segment display shows a message "Head Down" and here also we can fix the sensitivity level by another potentiometer.
Here we can easily change the message using Arduino as the code is very simple and user-friendly as compared to Machine Learning code and, here we have a circuit where we have 2 clampers so we can operate this project by directly connected with the car's battery.

Fig: -5: Implementation of project

6. ALGORITHM:

The algorithm is as follows.

- Start process.
- Data recognize from the eye blink sensor.
- Detect the data send by sensor.
- Process the sensed data.
- Check the mode.
- Normal mode else sleeping mode.
- Normal mode
- No LED
- Else if sleeping mode.
- LED on
- Stop the loop.
- Weather head nodding detected.
- LED on

7. RESULTS AND CONCLUSION:

The exploration and outline of driver fatigues and drowsy state detection & vigilance system are acquainted. The recommended system is used to prevent many road

catastrophes caused by drowsy and dizzy driving. And this apparatus used to secure the driver and alert him whether there is any chance of dizziness by any parameter like eyes closing or head nodding. This paper involves preventing many road catastrophes due to unconsciousness through eye blink and head-nodding sometimes. In this project, the eye blink sensor is fixed in the vehicle where if the driver loses his consciousness due to dizziness or drowsiness, then it will give vigilance to the driver through LED and LCD will also display the message to prevent the vehicle from catastrophes. The development of an Arduino for a vehicle also consists of a head-nodding sensor which will sense if the driver is sleepy or not and would not start the vehicle. The absolute study on transport safety is going to be the next thundering for the automobile industry for it to outlive and outlast every human from the threat and danger.

REFERENCES

1. Ueno H., Kanda, M. and Tsukino, M. “Development of Drowsiness Detection System”, IEEE Vehicle Navigation and Information Systems Conference Proceedings, (1994), ppA1-3,15-20.

2. Nora Kamarudin1, Nur Anida Jumad “Implementation of Haar Cascade Classifier and Eye Aspect Ratio for Driver Drowsiness Detection Using Raspberry Pi”, Universal Journal of Electrical and Electronic Engineering (2019)

3. Rau P. Drowsy Driver Detection and Warning System for Commercial Vehicle Drivers: Field Operational Test Design, Analysis, and Progress. National Highway Traffic Safety Administration; Washington, DC, USA: 2005.