DRIVERS STUPOR SCRUTINIZING SYSTEM

Sonia.R[1], Dhanyashree.R[2], Swathi M[3], Hemalatha.M[4]

[1]Assistant Professor. Department of Information Technology, Jeppiaar SRR Engineering College, Chennai, TN
[2,3,4] Students of Information Technology, Jeppiaar SRR Engineering College, Chennai, TN

Abstract - *Road accidents can be easily avoided by understanding psychological state of the drivers. Road accidents occurs during night driving due to drowsy state of vehicle driver. Driver stupor scrutinizing system that alerts subjects during the state of fatigue. Raspberry pi3 is used as the primary monitoring eye movement, facial landmarks are useful in warning drivers during initial sleep cycle phase of drowsiness. This system consists of two major detection to avoid initial accident scenarios such as lane detection and alcohol gas detection which complete monitoring and defensive system to protect driver from accidents. However, if a driver is in extreme state of sleep cycle a buzzer is used to give an alarm to wake up the driver. A complete monitoring system is integrated with lane detection to detect the lane and to detect the presence of obstacles in track of vehicle.MQ3 sensor and web module to find if the driver is consumed or not. If the driver is alcoholic the gsm module will alert response to take action under the emergency condition thus avoiding the risk of human errors.*

Key Words: Image processing, Raspberry pi, alcohol sensor, gsm, lane curves.

1. INTRODUCTION

Driver lethargy is a significant factor in a large number of road accidents particularly during long drive and night travel.[1] A module for Driver stupor scrutinizing system, is done using image processing, presented to reduce the number of accidents due to drivers fatigue and alcohol intake, hence increase the transportation safety this system deals with instinctive driver drowsiness detection based on visual information and Artificial Intelligence. The aim of this project is to develop a pattern for Fatigue and alcohol system. Driver Drowsiness and then they do rash driving as of that they do not have control on themselves. Here we designed a system which will detect driver drowsiness. [6]The dlib's facial landmark predictor to obtain 68 salient points used to localize the eyes, eyebrows, nose, mouth and jawlines. Eye Aspect Ratio(EAR) function which is used to precisely compute the ratio of distances between the vertical eye landmarks and the distance between the horizontal eye landmarks. [5] The primary purpose of this drowsiness and alcohol detection system is to develop a system that can reduce the number of accidents from drowsiness and drunk driving of vehicle. In Eye close detection is based on EAR algorithm, which calculates the value of eye closure, if the value falls but does not increase again,0thus implies that the driver has closed their eyes. Eye closing rate is calculated after each 10seconds, and if it crosses a predefined threshold value, then Raspberry pi sends a high pulse signal serially to its slave device Arduino Uno.

[3] On receiving the high pulse signal, the Arduino performs a set of tasks like Alarm by buzzer or send message to its car owner. On the other hand, alcohol sensor (MQ-3) is work as a Breathalyzer and calculate alcohol content (BAC) from breath alcohol content (BrAC). The Arduino is interface with MQ-3, Bluetooth, buzzer and relay. Arduino continuously checks alcohol content present in the air and also computes alcohol content in Percentage from it.

In this project several algorithms for efficient edge detection is employed and a comparative analysis is carried out. [1] For proper localization of a vehicle in between the desired region of interest (like between lanes or boundaries), it is very important to detect lanes and boundaries efficiently and it is also important to develop feedback algorithm for auto correction of vehicle motion in synchro with varying slopes of lanes or boundaries. [4]It is also very important to avoid confusion due to multiple lanes or shadow/illumination disturbances and noises which have similar features as lanes or boundaries. For solving all the above-mentioned problems, we developed algorithm which is integration of four important algorithms.

1.2 OBJECTIVE OF THE PROJECT

- To provide an image acquisition and fatigue detection.
- To implement corner edge, face, eye detection and plot facial landmarks.
- To detect alcohol intake by using breathalyzer and intimate via alarm.
- To implement and detect the final Canny edge and MOG reduction for HOUGH curve classification for lane detection.
- To perform concurrent scrutinization of fatigue, drunken driving and Lane detection using a compatible module at cost effective.

1.3 EXISTNG SYSTEM

- Reduction of sleep related crashes analyzing for the detecting stage, the eye blink sensor always monitors the eye blink moment.
- The techniques can be generally divided into categories
    - Blink Sensor
    - IR Sensor Infrared transmitter

- Alcohol sensor of type MQ4. It has a built-in circuit with sensitive material SnO2 in which the conductivity changes.
- It also has an electro-circuit used to convert change of conductivity to corresponding output signal of gas concentration.
- A lane detection and tracking system is a mechanism designed for localizing and tracking lane boundaries for road lanes.
- The comprehensive module consists of lane detection and tracking (LDT), lane departure warning (LDW) and lane marking recognition (LMR) systems; while the simplified module only focuses on LDT system.

1.4 LIMITATIONS

- The facial landmarks are not accurately scrutinized in existing work.
- There are more sensors been used which is not cost effective and may cause manufacturing defects for vehicles.
- The proposed system in this existing system does not directly impact or vehicle behavior, only detects the location of lane markings and sends necessary warning messages.
- The different features of any kind of road (desert area, mud road) are not much precisely known
- MQ series sensors use a small heater inside with an electro-chemical sensor in order to measure different kind of gases combinations.

1.5 PROPOSED SYSTEM

- The camera image provides trustable features such as facial landmarks, face and eyes for Eye Aspect Ratio estimation.
- By using EAR algorithm Region of Interest is calculated which is helpful in behavior analysis of driver.
- The alcohol sensor (MQ3) is a semiconductor sensor in which the change of conductivity is converted to gas concentration, which represents the amount of alcohol consumed.
- The implementation of concepts like, clustering of Hough lines, weighted centroids, perspective vision, slope filtering, shadow and illumination correction.
- These concepts provide very accurate and efficient algorithm for curvy lane detection or curve detection with desired slopes.

1.6 ADVANTAGES

- Record driving data, collision data and position data and Analyze the accidents detail.
- Send location of car and its maintenance to base station through GPS & GSM.
- Sense gas & fuel leakage and display its status on car monitoring system.
- Detects if the driver is drunk or not and is feeling sleepy.
- The proposed work makes the system easier to be implemented in all vehicles at affordable cost and security of vehicles.

1.7 DROWSINESS DETECTION

Driver Fatigue Detection can actively monitor driver vigilance level and alert the driver for any insecure driving condition. [6]The primary purpose of this drowsiness detection system is to develop a system that can reduce the number of accidents due to drowsiness. In the first part of our project is detection of drowsiness, for that we use a camera for detecting image or facial landmarks, face, and Eye detection is the important part of this project will be done using OpenCV. [7]The Input 8-megapixel camera, which is capable of capturing real time images and video. The captured frame is to be processed by Raspberry pi. Raspberry pi algorithm is implemented using Python.

Eye close detection is based on Haar cascade classifier performs several comparisons from a database of positive value and negative value of images and returns a red border rectangle over the detected area on matching. Discussing the tradeoffs between Haar cascades and HOG + Linear SVM detectors, Examining the buzzer to create the alarm that will sound if a driver/user gets tired. Implementing dlib's facial landmark optimizations so we can deploy our drowsiness detector to the Raspberry Pi. Viewing the results of our optimized driver drowsiness detection algorithm on the Raspberry Pi.

The EAR algorithm is responsible for detecting driver drowsiness, the eye that is fully open and an eye that is closed, the eye facial landmarks is been plotted. Then plots the eye aspect ratio over time. The eye aspect ratio is constant (indicating that the eye is open), then rapidly drops to close to zero, then increases again, indicating a blink has taken place. While HOG + Linear SVM detectors tend to be significantly more accurate than Haar cascades, the cascade method is also *much* faster than HOG + Linear SVM detection algorithms

Fig-1.1 RaspberryPi3ModelB board

Fig-1.2 System components

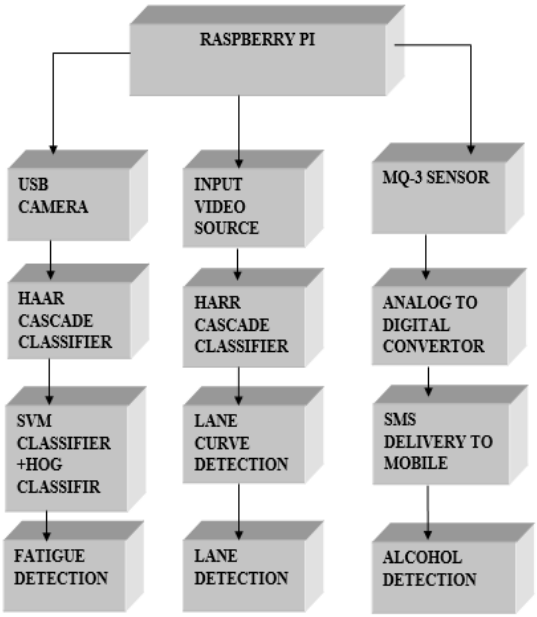

Fig -1.3 SYSTEM ARCHITECTURE

1.8 ALCOHOL DETECTION

The Alcohol sensor MQ-3 is selected in this system due to its high sensitivity in detection and has good resistance to disturb of gasoline, smoke and vapor. The sensor able to detect Blood Alcohol Content (BAC) with different concentration and classified to the range of BAC detected into a few levels. [8]Alcohol sensor MQ3 is suitable for detecting alcohol concentration just like our common breathalyser. It has a high sensitivity and fast response time. The system begins to operate when the alcohol sensor detected BAC level from the driver. BAC level detected by alcohol sensor is based on gas/ alcohol concentration in ppm (parts per million).[5] This system is tested by alcoholic drinks/after shave lotion as the input to the experiment. [2]The alcohol sensor can sense an alcohol from human breath from 0 ppm until 1000 ppm.

In this system is the alcoholic intoxication is displayed in the percentage, for that purpose we program as per our condition that voltage samples is converted into percentage using Mapping Concept. The result is categorized into three conditions of the driver with different value (in percentage) of BAC level which are intoxication, drunkenness and over limit drunk.

LANE DETECTION

Even one of the biggest hurdles for new autonomous vehicles is to detect curvy lanes, multiple lanes and lanes with a lot of discontinuity and noise. [4]The proposed works presents very efficient and advanced algorithm for detecting curves having desired slopes (especially for detecting curvy lanes in real time) and detection of curves (lanes) with a lot of noise, discontinuity and disturbances. Even in some of most famous and useful libraries like OpenCV and MATLAB, there is no function available for detecting curves of desired slopes, shapes, discontinuities.

It is also very important to avoid confusion due to multiple lanes or shadow/illumination disturbances and noises which have similar features as lanes or boundaries. Process is combination of four important algorithms, out of which two algorithms are new and unique and very efficient. [4]Four algorithms are: Dissection of curves into large number of Hough lines (called Curve stitching) and then implementing Mean value theorem, differentiating various curves (lanes) based on slope of curves. For detecting such lines, it is important to properly set all the parameters of Hough transform. Two of most important parameter is: Hough votes and minimum distance between points which are to be joined to make a line.

Even in the case where there are many curves of similar slope characteristics in the same frame, this algorithm can be used to filter out the single desired curve. [4]We used important concepts called clustering of Hough lines, weighted centroid and slope filtering. These are some important parameter which helps to localize the vehicle in between the lanes even in case of discontinuous lanes or absent boundaries. This feedback system is based on three parameter texture analysis, distance analysis and shadow/illumination correction. Dissect the curves into infinite Hough lines (called Curve stitching) and then by applying various algorithm on these Hough lines, we developed a robust algorithm to detect any curvy lanes.

CONCLUSION

An Illustrative comparative analysis performed on the test image captured by USB Webcam and fatigue, alcohol, lane detection is performed in OpenCV on Raspberry Pi board. Monitoring and detecting the driver's behaviour to ensure road safety is important because road accidents take place. Hence it is important to capture driver behaviour which will control the accidents due to rash driving under the influence of alcohol. The proposed system deals with detection of Alcohol and Drowsiness using sensors and accordingly precautions are taken and ensure driver safety. The entire work has been performed in OpenCV by adopting python as a programming language Finally, the unique and robust algorithm for detecting any type of curve (curvy lanes) with the help of tangents of the curve. This algorithm is applicable even in adverse conditions and provides a

general method to detect any curve with desired slopes. These algorithms can be implemented on autonomous vehicle for robust lane detection and it can also be used in normal vehicle for speed control feedback system to avoid fatal curves on roads.

REFERENCES

[1] Ambekar Shivam Nivrutti, Korde Mohan Rajaram, Patil Sagar Rajendra, Puranik Shubham Dipak, Prof. Pushpendu Biswas, Prof. Bajirao Subhash Shirole," DRIVER DROWSINESS DETECTION SYSTEM", Computer Department, Sanghavi College of Engineering, Nashik, Maharashtra, India, June 2017.

[2] R N daschoudhary, rajashree tripathy," REAL TIME FACE DETECTION AND TRACKING USING HAAR CLASSIFIER ON SOC", Professor, Research Scholar, Department of EIE - Siksha O Anusandhan University.

[3] Rajasekar. R, Vivek Bharat Pattni, S. Vanangamudi," DROWSY DRIVER SLEEPING DEVICE AND DRIVER ALERT SYSTEM", Project Supervisor, Professor, Department of Automobile Engineering, BIST, Bharath University, Selaiyur, Chennai, TamilNadu, India, Volume 3 Issue 4, April 2014.

[4] Amartansh Dubey and K. M. Bhurchandi," ROBUST AND REAL TIME DETECTION OF CURVY LANES (CURVES) WITH DESIRED SLOPES FOR DRIVING ASSISTANCE AND AUTONOMOUS VEHICLES",Department of Electronics and Communication Engineering, Visvesvaraya Natioanal Institute of Technology, Nagpur, India.

[5] Mitharwal Surendra Singh L., Ajgar Bhavana G., Shinde Pooja S., Maske Ashish M," EYE TRACKING BASED DRIVER DROWSINESS MONITORING AND WARNING SYSTEM", Department of Electronics and Telecommunication Institute of Knowledge College of Engineering Pune, India, International Journal of Technical Research and Applications e-ISSN: 2320-8163, Volume 3, Issue 3 (May-June 2015), PP. 190-194

[6] Shivam Nivrutti Ambekar, Mohan Rajaram Korde, Sagar Rajendra Patil, Shubham Dipak Puranic,"DRIVER DROWSINESS DETECTION SYSTEM", Computer Engineering Sanghavi College of Engineering Nashik, India, International Journal of Science Technology Management and Research, Volume 1, Issue 9, December 2016.

[7] K.srijayathi, M.vedachary," IMPLEMENTATION OF THE DRIVER DROWSINESS DETECTION SYSTEM", International Journal of Science, Engineering and Technology Research (IJSETR) Volume 2, Issue 9, September 2013.

[8] Tejasweeni Musale, Prof. B. H. Pansambal," REAL TIME DRIVER DROWSINESS DETECTION SYSTEM USING IMAGE PROCESSING", Bhivarabai Sawant College Of Eng ineering and Research, Narhe, Pune, Maharashtra, India, International Journal for Research in Engineering Application & Management IJREAM ISSN : 2494-9150 Vol-02, Issue 08, Nov 2016.