An Intelligent Driver Drowsiness Detection System Using Image Processing

[1]Kajal Lanke, [2]Pratiksha Kalamkar, [3]Rasal Jayashri, [4]Marne Shweta

Department of Computer Engineering Zeal College of Engineering & Research, University of Pune.

Abstract: *Accident is today's major problem. People driving vehicle carelessly,so accidents are increasing. Drowsiness while driving is one of the main causes of accident, especially one way routes such as highways. According to the National Highway Traffic Safety Administration of the United States of America (USA), starting from 2005,there is an estimated 1,00,000 police reported crashes per year, caused by driver drowsiness.The aim of our project is to develop a model for sleepiness detection system .The focus are placed on planning a system can accurately monitor the open or closed state of the driver's eyes and alcohol detection system will truly prevent a car from starting if driver is intoxicated.*

In proposed system we are detecting driver drowsiness by using camera and also detecting alcohol by using breathalyzer mechanism and ignition inter-lock device in image processing. This system also detect driver yawing while driving vehicle. So, as the rate of accidents is increasing day by day, it helps to reduce the ratio of accident because of drowsiness and alcohol detection as well.

Keywords : Certificate Authority, Certificateless Public Key Cryptography, Chosen Plaintext Attack, KGC, RSA, PRE, SEM.

1. INTRODUCTION

For people who usually need to work overtime, the risk of being drowsy when driving home increases significantly owing to fatigue and stress accumulation. Therefore, a driver drowsiness detection system is desired for improving the safety of the people on roads. this resulted in an estimated 1,550 deaths, 71,000 injuries, and $12.5 billion money losses. Sleep-deprived driving (commonly known as tired driving, drowsy driving) is the operation of a motor vehicle while being cognitively impaired by a lack of sleep. The reason that accidents are mostly likely to happen during the mid-night may have to do with the biological time clock.

[6] S.Lawoyin, X. Liu,D-Y.fei,and o.Bai "*Detection methods for a low cost accelerometer-based approach for driver drowsinessdetection"*

[3]S.Sooksatra,T.Kondo,andT.Bunnu n. "*using distance and gradient vectors*".[4] M. B. Dkhil, M. Neji, A Wali and A.M.Alini"*A new approach for a safe car assistance system*," [8]B.-G. Lee and W.-Y. Chung,"*Driver alertness monitoring using fusion of facial features and bio-signals*".

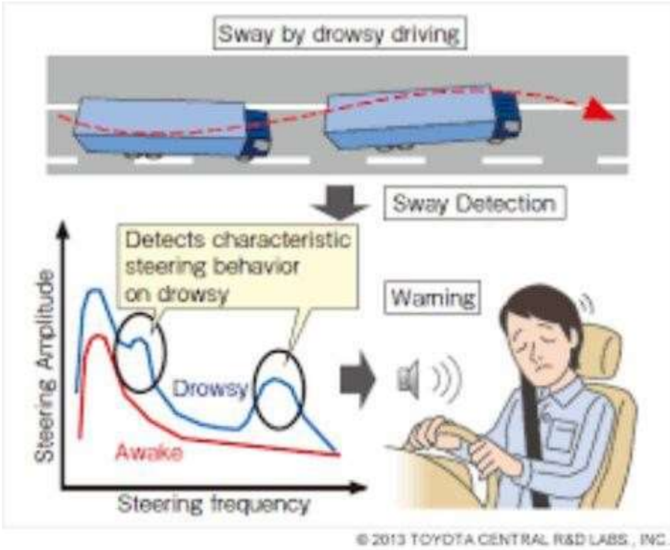

Fig 1: Human Drowsiness

2. SYSTEM STRUCTURE

Design of the proposed real-time driver drowsiness detection system is shown in Fig.2.1. In previous system".[4]M.B.Dkhil,M.Neji,A.Wali,A.M.Alini, "*A new approach for a safe car assistance system*,"used EPOC head setto acquire the electroencephalogram(EEG) signals. Eye detection is done by Viola and Jones technique,.but limitation of this paper was System was mainly based on computer vision techniques. The other previous system was [6] S.Lawoyin, X. Liu, D- Y.Fei,O.Bai"*Detection methods for a low cost accelerometer-based approach for driver drowsiness detection*",but it required more video sequences in more diversified lighting.

In this paper"[3]S.Sooksatra,T.Kondo,P.Bunun "*using distance and gradient vectors*" this required . Despite the efficacy of the SWM method, it has yet to be deployed widely on motor vehicles as a practical means for individual early detection due to the cost prohibitive nature of current methods as well as complexity of installation and implementation. In our system, the driver drowsiness detection is mainly determined by the driver behavior that is extracted from the motion data collected from camera. Drowsiness while driving is one of the main causes of fatal accidents, especially on highways. The aim of system is to detect driver drowsiness, alcohol and yawning. While Driver driving a car, head movement will be captured by camera and it will send to a micro controller .If driver is in drowsiness condition then sensors will sense and Breathalyzer mechanism will be used. This data in the form of analog signal will be converted it into the digital form and will be sent to the microcontroller. Then system will give the alarm. And if driver is alcoholic then also it will give the alarm.

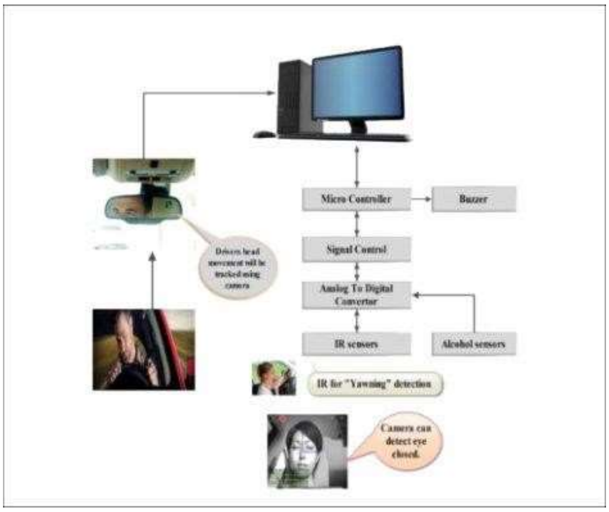

Fig 2: Architecture diagram

3. PROCESSING

Fig 3: Detection Algorithm

3.1 BLURRING

In image terms blurring means that each pixel in the source image gets spread over and mixed into surrounding pixels. Another way to look at this is that each pixel in the destination image is made up out of a mixture of surrounding pixels from the source image.

Original Image Blurred Image

Steps / Algorithm

Step 1: Traverse through entire input image array.

Step 2: Read individual pixel color value (24-bit).

Step 3: Split the color value into individual R, G and B 8- bit values.

Step 4: Calculate the RGB average of surrounding pixels and assign this average value to it.

Step 5: Repeat the above step for each pixel.

Step 6: Store the new value at same location in output image.

Why should we create a Blurred Image?

Blurring an image reduces the sharpening effect; this makes the detection more accurate.

There two type of blurring an image

1. Gray scaled blur
2. Color blur

g = (col >> 8) & 0xff; Then we will get the average value of all the

r = (col >> 16) & 0xff; surrounding zeros "0" and that value will

// adding gray scale component to sum.

sum = (r+g+b)/3; //We are calculating the Average of RGB using gray scale formula.

// average of 8

. surrounding pixels and
center r = g = b = sum / 9;

Y = (b | (g<<8) | (r<<16)); // Storing the calculated values to the output array.

3.2 *RGB TO HSV*

Color vision can be processed using RGB color space or HSV color space. RGB color space describes colors in terms of the amount of red, green, and blue present. HSV color space describes colors in terms of the **H**ue, **S**aturation, and **V**alue. In situations where color description plays an integral role, the HSV color model is often preferred over the RGB model. The HSV model describes colors similarly to how the human eye tends to perceive color. RGB defines color in terms of a combination of primary colors, whereas, HSV describes color using more familiar comparisons such as color, vibrancy and brightness. The basketball robot uses HSV color space to process color vision.

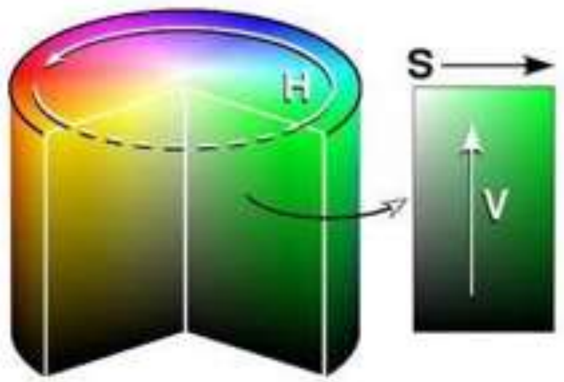

Fig 4: RGB TO HSV

```
// r,g,b values are from 0 to 1

min = MIN( r, g, b );
max = MAX( r, g, b );
*v = max; // v
delta = max - min; ( max != 0 )
*s = delta / max; // s

// r = g = b = 0 // s = 0, v is undefined
*s = 0;
*h = -1;
return;

( r == max )
*h = ( g - b ) / delta; // between yellow & Magenta

( g == max )
*h = 2 + ( b - r ) / delta; // between cyan & yellow

*h = 4 + ( r - g ) / delta; // between magenta & cyan
*h *= 60; // degrees

( *h < 0 )
*h += 360;
```

Fig 5: HSV THRESOLDING

This option is similar to the Threshold RGB process, except that instead of selecting pixels on the Red, green and Blue components of their colour, it selects pixels by either their hue, saturation and luminance (HSL), or hue, saturation and value (HSV). Hue is the same in both the HSL and HSV colour models, but saturation is defined differently in each, and luminance is not the same as *value*. Here is how to visualize the HSV color model: Because *hue* is represented as a circle, it is measured in angular degrees from 0 through to 360. Zero degrees is pure Red, 60 degrees is yellow, 120 degrees is green, 180 degrees is cyan, 240 degrees is blue, 300 degrees is magenta and 360 degrees is back to red.

Saturation and *value* both range from 0 through to 100%. At full saturation and full *value* (100%) the hue is most intense. AS the saturation is decreases the color moves towards white. But as the *value* decreases the colour moves towards Black.

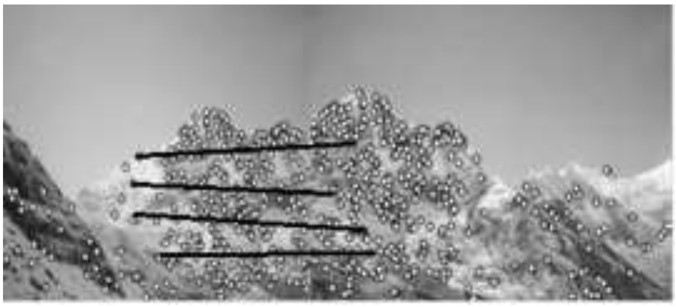

Fig 5: Blob Detection

blob detection refers to visual modules that are aimed at detecting points and/or regions in the image that differ in properties like brightness or color compared to the surrounding. There are two main classes of blob detectors (i) *differential methods* based on derivative expressions and (ii) *methods based on local extreme* in the intensity landscape. With the more recent terminology used in the field, these operators can also be referred to as *interest point operators*, or alternatively interest region operators (see also interest point detection and corner detection).

3.3 *CENTER OF GRAVITY*

Center of gravity is used to detect the human displacement. If human move is head to left or right it finds tilled displacement. After that it will give alarm to that driver. And it calculate to finding coordinate of x axis and y-axis. That movement will mark by system.

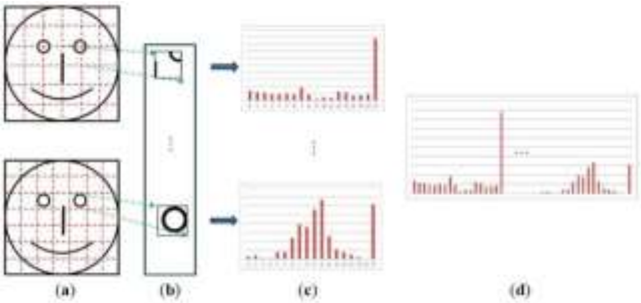

Fig 6: *CENTER OF GRAVITY*

Cx=(Xmax+Xmin/2)

Cy=(Ymax+Ymin/2)

REFERENCES

[1] *The Grim Stats Associated With Drowsy Driving*, accessed on Mar. 23, 2016. [Online]. Available: http://www.huffingtonpost.com/2014/06/09/drowsy-driving_n_5475021.html

[2] Facts and State Accessed on Mar 23 2015 [Online].Available:http://drowsydriving.org/about/facts - and-stats/

[3] Sooksatra, T. Kondo, and P. Bunnun, "*A drowsiness detection method using distance and gradient vectors*," presented at the 6th Int. Conf. Inf.Commun. Technol Embedded Syst. (IC-ICTES), Hua-Hin, Thailand,Mar. 2015, ppl 1–5. [Online]. Available:http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7110812&newsearch=true&queryText=A%20drowsiness%20detection%20method%20using%20distance%20and%20gradient%20vectors.

[4] M. B. Dkhil, M. Neji, A. Wali, and A. M. Alimi, "*A new approach for a safe car assistance system*," in *Proc. 4th Int. Conf. Adv. Logistics Transport (ICALT)*, May 2015, pp. 217–222 [Online]. Available: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7136627& new search= True&queryText=A%20new%20approach%20for%20a%20safe.

[5] Q. Wang, H. Wang, C. X. Zhao, and J. Y. Yang, "*Driver fatigue detection technology in active safety systems,*" in *Proc. Int. Conf. Remote Sens., Environ. Transp. Eng. (RSETE)*, Jun 2011. [Online].Available:http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=5964969&newsearch=true&queryText=Driver%20fatigue%20detection%20technology%20in%20active%20safety%20system.

[6] B.-G. Lee and W.-Y. Chung, "*Driver alertness monitoring using fusion of facial features and bio-signals*," *IEEE Sensors J.*, vol. 12, no. 7,pp. 2416–2422, July. 2012. [Online].Available:http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6166846