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Advance Driver Assistant System using Artificial Intelligence

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Abstract: Automated driving will have a big impact on society, creating new possibilities for mobility and reducing road accidents. Current developments aim to provide driver assistance in the form of conditional and partial automation. The presence of Computer vision technologies inside the vehicles is expected to grow as the automation levels increase. However, embedding a vision-based driver assistance system supposes a big challenge due to the special features of vision algorithms, the existing constrains and the strict requirements that need to be fulfilled. The aim of this project is to leverage Vision based Artificial Intelligence for assisting the driver to the next level. Like Face Recognition Security Feature (Inside Vehicle).Drowsiness Detection System(Inside Vehicle) , Pedestrian Detection (Outside Vehicle).Just by using Camera with powerful Compute Vision and Machine Learning algorithms, the system itself will be very Effective and reduces overall cost for development.

Keywords: Maximally Stable External Region, Convoluted Neural Networks, Histogram of Oriented Gradient

I. INTRODUCTION

With the advent of smart phones, Android has become the dominating mobile OS functioning on over 1.2 million devices worldwide[1]. Android provides an efficient SDK which when used with Android Studio IDE can help create applications quickly and easily. World Health Organisation estimated about 1.35 million death all around the globe due to road traffic which can be approximated to about 1 death in 25 seconds in the year 2016. A majority of these accidents occur due to lack of attentiveness while departing lanes / lane splitting. The purpose of this paper is to create a smart driver assistant which will help the driver make rational decisions based on the real-time environment. The system marks lanes in front of the car with image processed highlighting and colored tracking. Along with this, the system will ensure that the driver never misses a traffic sign. The system constantly grabs each and every traffic symbol along the path and makes the information available to the driver through voice assistant. The following sections provides sufficient background and insight into our objective to develop the Smart Driver Assistant

II. RELATED WORKS

1) Title: Analyses Of Driver's Body Movement For Detection Of Hypovigilance Due To Non-Driving Cognitive Task

a) Author: M. Itoh, H. Nagasaku and T. Inagaki This paper investigates how driver's body movement may be affected by a non-driving and possibly distractive cognitive task. We have collected data on body movement under several settings, such as cases in which cognitive tasks are given intermittently, or cases in which cognitive tasks are given for a relatively long time period. A driver-adaptable method is proposed for detection of increase in tension via body movement. The method is evaluated with experimental data.

2) Title: Characteristics Of Crashes Attributed To The Driver Having Falle Asleep

a) *Author:* Allan I. Pacic, Andrew M. Pack, Eric Rodgman, Andrew Cucchiara, David F. Dinges And C. William Schwab of : While it has been .known for some time that crashes can result from the driver falling asleep at the wheel, this issue has received less attention in traffic safety programs than the role of alcohol or speed of the vehicle. The present study was done to investigate the characteristics of crashes attributed to the driver being asleep. The study utilized the database at the Highway Safety Research Center at the University of North Carolina that is based on the uniform crash reporting system in that state. Over the years 1990-1992, inclusive, there were 4333 crashes in which the driver was judged to be asleep but not intoxicated. The crashes were primarily of the drive-off-the-road type (78% of the total) and took place at higher speeds (62% in excess of 50 mph). The fatality rate was of similar magnitude to that in alcohol-related crashes with fatalities in 1.4% of such crashes (alcohol crashes had fatalities in 2.1%). The crashes occurred primarily at two times of day-during the nighttime period of increased sleepiness (midnight to 7.00 a.m.) and during the mid-afternoon "siesta" time of increased sleepiness (3.00 p.m.). These crashes occurred predominately in young people. Fifty-five percent of these were in individuals 25 years of age or younger, with a peak age of occurrence at age 20 years. Sleepiness may play a role in crashes other than those attributed by the police to the driver being asleep. Determining the magnitude of this role is a challenge to the traffic safety community.

3) *Title:* Methods Of Testing For Sleeplessness

a) *Author: Dr. Merrill M. Mitler PhD a & Dr. James C. Miller PhD, CPE of* Normal nonrandom fluctuations in daily human perjhnunce have been doc- umented for years. Published research reports have shown putterns of work- ers' errors in reading gas meters, operators' delays in answering calls, dri- t9er.s' drowsiness, sleepy locomotive engineers' automatic breaking. vehicle crashes, deaths resulting from disease, brief periods qf sleep, and sleep laten- c-y in structured naps. The authors summarized these data sets and,fitted them with a two-peak-per-day cosine curve derived from the population growth function used in chaos theory. Median parameters extracted from the curve fits predicted a sharp petrk of sleepiness at 2:30 AM and a secondary peak at 2:30 PM. The shape cf the curve was modiJied by u nonlinear sleep-depriva- tion factor: The model appeared to be biological rather than behavioral or social becuuse it applied well to disease-related deaths. The authors also review measurement of sleepiness through electroencephalographic. monitor- ing, self-reports, pupillography, and the Multiple Sleep Latency and the Main- tenance of Wakefulness Tests.

4) *Title: Intelligent River Drowsiness Detection Through Fusion Of Yawning And Eye Closure*

a) *Author: M. Omidyeganeh1, 2, A. Javadtalab2, S. Shirmohammadi2*

b) *Abstract:* Driver drowsiness is a major factor in most driving accidents. In this paper we present a robust and intelligent scheme for driver drowsiness detection employing the fusion of eye closure and yawning detection methods. In this approach, the driver’s facial appearance is captured via a camera installed in the car. In the first step, the face region is detected and tracked in the captured video sequence utilizing computer vision techniques. Next, the eye and mouth areas are extracted from the face; and they are studied to find signs of driver fatigue. Finally, in a fusion phase the driver state is determined and a warning message is sent to the driver if the drowsiness is detected. Our experiments prove the high efficiency of the proposed idea.

5) *Title: DETERMINANTS OF SLEEPINESS IN AUTOMOBILE DRIVERS***:** *P. Philip, I. Ghorayeb,R. Stoohs,I" J.C. Menny, P. Dabadie,I" B. Bioulac And C. Guilleminault*

Of Governmental agencies do not systematically investigate the presence of daytime sleepiness as a determinant of driving accidents. We surveyed automobile drivers traveling on summer vacations and driving long distances on a European highway. We evaluated their subjective daytime sleepiness while driving and any sleep deprivation just prior to departure. Five-hundred sixty-seven automobile drivers (mean age 37.7 + 11 years) were interviewed at a roadside rest-stop. Questions covered the sleep/wake schedule during the year, sleep habits, and the presence of symptoms frequently associated with sleep- disordered breathing. Sleep behavior just prior to departure was compared to the usual sleep schedule during the year. Fifty percent of the responders had a sleep restriction just prior to departure (mean -203 minutes) compared to usual total sleep time during the year; 10°70h ad no nocturnal sleep prior to departure. Drivers younger than 30 years were significantly more acutely sleep deprived than other drivers. Economic migrants (subjects with low economic status) also experienced significant acute sleep restriction.

6) *Title:* Design Of Lane-Keeping Control With Steering Torque Input

a) *Author: Masayasu Shimakage, Shigeki Satoh, Kenya Uenuma, Hiroshi Mouri*

b) *Abstract:* This paper describes a procedure for the design of lane-keeping control that uses steering torque as the control input. The servo control system was designed on the basis of H2 control theory. Robustness against disturbances and parameter variation was confirmed by m-analysis. The control performance of the system was first confirmed by simulations conducted under a variety of conditions, followed by driving tests with an actual vehicle which show that the desired performance was obtained. The method in this paper achieves an outstanding balance of excellent lane-keeping control, smooth steering motion and easy steering action by the driver.

III. EXISTING SYSTEM

A. Depends on non smart sensor data which might fail to produce better results.

B. Accuracy when compared to visual data will be less than 50%.

C. High quality sensor to be used for all the modules.

IV. PROPOSED SYSTEM

A. In proposed system the involvement of artificial intelligence, will fetch robust yet best results.

B. The data helps in predicting at a higher accuracy of 90% with less slip through rate less than 10%.

C. In this method usage of single camera yields all the functionalities of modules.

D. The proposed system uses open source technologies as the cost decreases as no buying of software is involved. The overall accuracy of system is higher than 90% for all the modules

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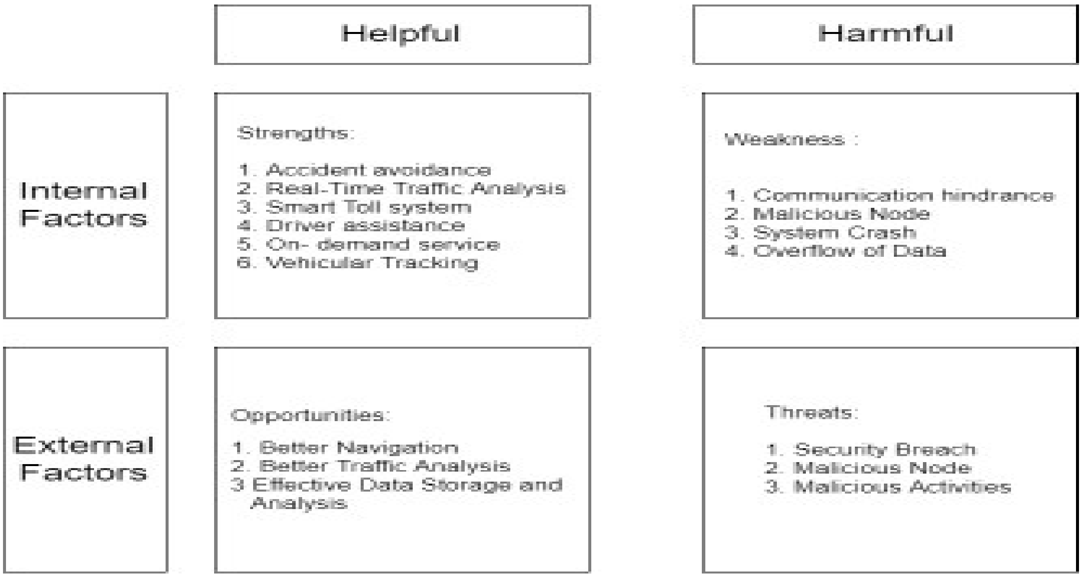
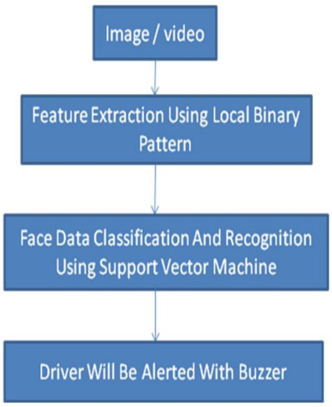


Fig 1: risk Analysis

V. BLOCK DIAGRAMS

A. Face Recognition Security Feature (Inside Vehicle)



The video feed of the user extracts the image of the user. Using local binary pattern feature extraction is done. Then data classification of the face is done using support vector machine
And based on the image that are already present in the database the evaluation is done and the
User is alerted if needed

1) *Local Binary Pattern (LBP):* It is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, LBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the LBP operator in real-world applications is its robustness to monotonic gray-scale changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyze images in challenging real-time settings.
2) *Support Vector Machine:* "Support Vector Machine" (SVM) is a supervised machine learning algorithm which can be used for both classification and regression challenges. However, it is mostly used in classification problems. In this algorithm, we plot each data item as a point in n-dimensional space (where n is number of features you have) with the value of each feature being the value of a particular coordinate. Then, we perform classification by finding the hyper-plane that differentiates the two classes very well. Drowsiness Detection System (Inside Vehicle)

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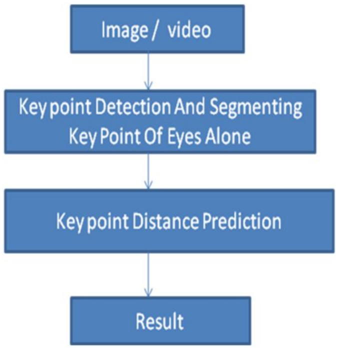

This is very similar to facial detection but with the help of dlib library feature extraction happens and facial landmark detection measures the distance between eyelids and keeps the measure in database if there is change in the measure of eyelids for prefixed amount of frames if there is change then the user is alerted

VI. RESULTS

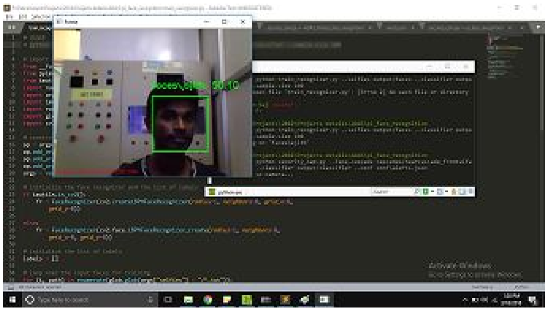

Fig 4: face recognition

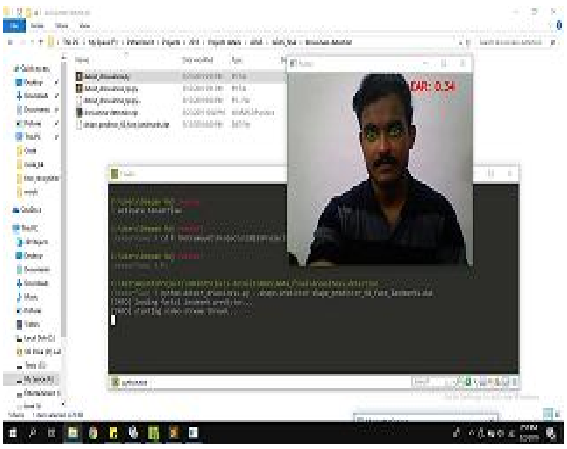

Fig 5: Detect Drowsiness

VII. CONCLUSION

The aim of this project is to leverage Vision based Artificial Intelligence for assisting the driver to the next level. Like Face Recognition Security Feature (Inside Vehicle), Drowsiness Detection System (Inside Vehicle), Pedestrian Detection (Outside Vehicle).Just by using Camera with powerful Compute Vision and Machine Learning algorithms, the system itself will be very effective and reduces overall cost for development.

VIII. FUTURE ENHANCEMENT

In future we concentrate on security and effective results better than this proposed system and more research work needed to provide analysing and detecting results

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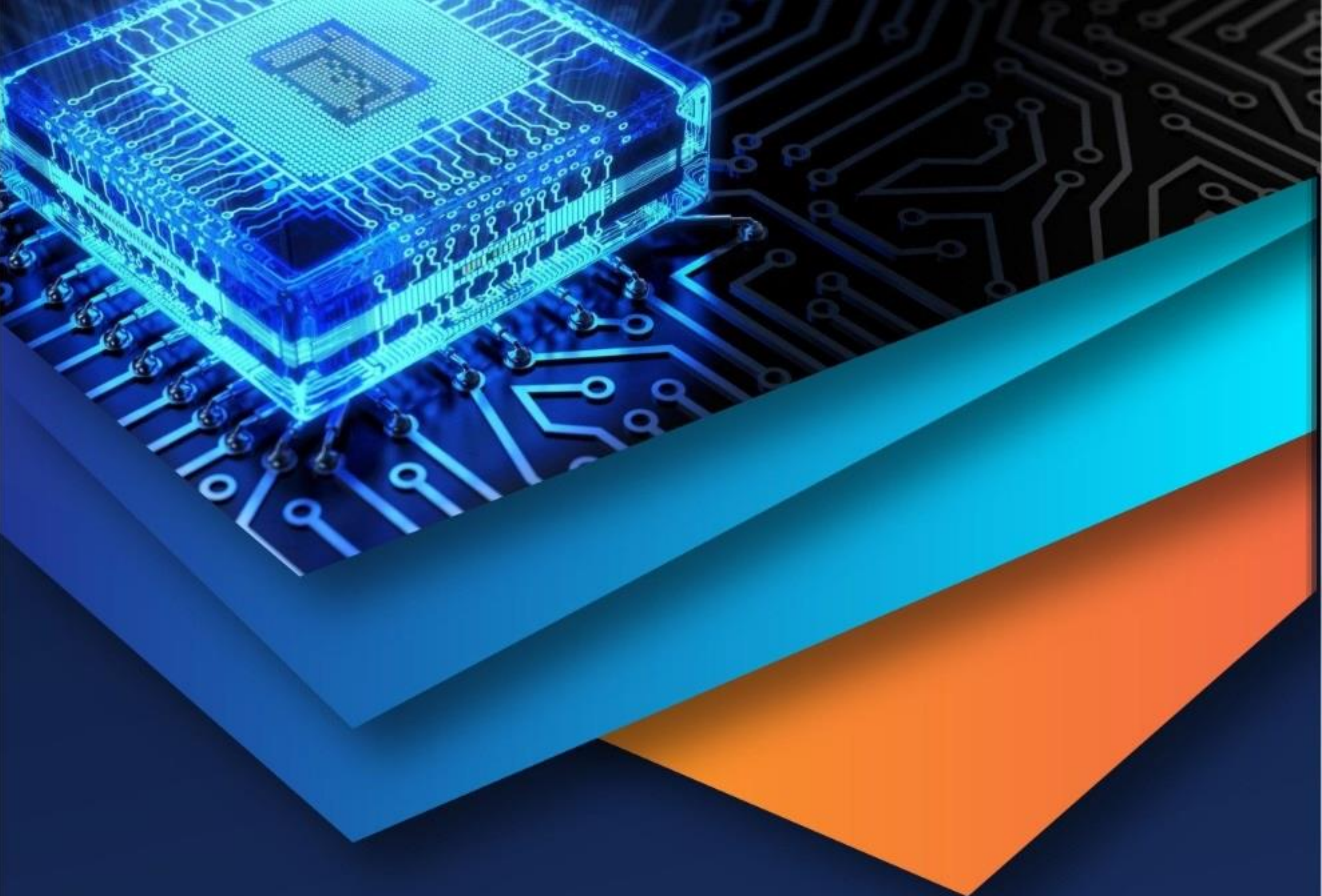

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