DRIVER DROWSINESS DETECTION SYSTEM

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Abstract: Drowsiness and Fatigue of drivers are amongst the many causes of road accidents. Due to them every year, there is increase in the amounts of deaths and fatalities injuries globally. In this Scenario, a module for Advanced Driver Assistance System (ADAS) is presented to reduce the number of accidents due to drivers fatigue and hence increase the transportation safety; this system deals with automatic driver drowsiness detection supported visual information and AI. We propose an algorithm to locate, track, and analyse both the drivers face and eyes to live PERCLOS, a scientifically supported measure of drowsiness related to slow eye closure.

Keywords: **Driver Drowsiness, Eye Detection, Alert Alarm, Blink Pattern, Fatigue**

I. INTRODUCTION

Humans have always invented machines and devised techniques to ease and protect their lives, for mundane activities to figure, or for more interesting purposes like aircraft travel. As there has been an advancement in technology, modes of transportation kept on advancing and our dependency on it started increasing exponentially. It's greatly affected our lives as we all know it. Now, we are able to jaunt places at a pace that even our grandparents wouldn't have thought possible. In contemporary world, almost everyone during this world uses some variety of transportation each day. Some people are rich enough to have their own private vehicles while others use public transportation. However, there are some rules and codes of conduct for those that drive no matter their status.one amongst them is staying alert and active while driving.

Neglecting our duties towards safer travel has enabled many thousands of tragedies to urge related to this excellent invention per annum. It's going to look like a trivial thing to most folk but following rules and regulations on the road is of utmost importance. While on road, an vehicle wields the most power and in irresponsible hands, it can be destructive and sometimes, that carelessness can harm lives even of the people on the road. One quite carelessness isn't admitting we are too tired to drive. In an attempt to monitor and restrict a destructive outcome from such negligence, many researchers have written research papers on the topic i.e., driver drowsiness detection systems. But now and then the points and observations made by the system aren't accurate enough. Hence, to supply data and another perspective on the matter at hand, so as to enhance their implementations and to further optimize the answer, this project has been done.

II. LITERATURE SURVEY

Existing detection system uses iris sensor for the drowsiness drive an occasional cost and easy distributed sensors model that particularly suitable for measuring blink of the drive accident and hand position on a wheel .these sensors are often utilized in automotive active safety system that aim at detection driver fatigue a serious issue to stop road accident the key point of this approach is to style a prototype of sensor units in order that it can function platform for integration different sorts of sensors into the wheel. The wheel is slowed or stopped counting on the condition. An identical existing system uses the adaptive driver for the detection of the drowsiness truck driver company car drivers and shift workers are the foremost in danger of falling asleep while driving majority of the accident occurs thanks to the drunkenness of the driving force. The misfortune of the which lies on the corporate owner as they made liable it can cause economic loss during this presentation, we present an adaptive driver and company owner alert system and an application that gives driving behaviour to the corporate owner. This survey is completed to understand the requirement and prerequisite of the overall population, and to try to per se to, we went through different sites and applications and hunted for the basic data. Based on these data, an audit is carried out which helps us to get new thoughts and make different
arrangements for our task. progress in this field too.

Driver drowsiness detection using ANN image processing:

In this Paper they have introduce the possibility to develop a drowsiness detection system for car drivers based on three types of methods: EEG and EOG signal processing and driver image analysis. In previous works the authors have described the researches on the first two methods. In this paper they have introduce the possibility to detect the drowsy or alert state of the driver based on the images taken during driving and by analysing the state of the driver eyes: opened, half-opened and closed. For this purpose, two kinds of artificial neural networks were employed: a 1 hidden layer network and an autoencoder network.

Review of driver fatigue/drowsiness detection methods.:

Driver fatigue/drowsiness is one of the important causes of serious traffic accidents and results in so many people deaths or injuries, but also substantial directly and indirectly economic expenses. Therefore, many countries make great effort on how to detect drowsiness during driving. The author proposed, the recent developments of driver fatigue/drowsiness detection technology of worldwide and try to classify the existing methods into several kinds according to different features measured, and analysed. Finally, the challenges faced to fatigue/drowsiness detection technology and the development trend are presented.

Fusion of Optimized Indicators from Advanced Driver Assistance Systems (ADAS) for Driver Drowsiness Detection:

In this paper the authors have introduced a non-intrusive approach for monitoring driver drowsiness using the fusion of several optimized indicators based on driver physical and driving performance measures, obtained from ADAS (Advanced Driver Assistant Systems) in simulated conditions. The paper is focused on real-time drowsiness detection technology rather than on long-term sleep/awake regulation prediction technology. They have developed our own vision system in order to obtain robust and optimized driver indicators able to be used in simulators and future real environments. These indicators are principally based on driver physical and driving performance skills. The fusion of several indicators, proposed in the literature, is evaluated using a neural network and a stochastic optimization method to obtain the best combination. They propose a new method for ground-truth generation based on a supervised Karolinska Sleepiness Scale (KSS). An extensive evaluation of indicators, derived from trials over a third-generation simulator with several test subjects during different driving sessions, was performed. The main conclusions about the performance of single indicators and the best combinations of them are included, as well as the future works derived from this study.

Microcontroller based driver alertness detection systems to detect drowsiness:

The advancement of embedded system for detecting and preventing drowsiness in a vehicle is a major challenge for road traffic accident systems. To prevent drowsiness while driving, it is necessary to have an alert system that can detect a decline in driver concentration and send a signal to the driver. Studies have shown that traffic accidents usually occur when the driver is distracted while driving. In this paper the author proposed, reviewed a number of detection systems to monitor the concentration of a car driver and propose a portable Driver Alertness Detection System (DADS) to determine the level of concentration of the driver based on pixelated coloration detection technique using facial recognition. A portable camera will be placed at the front visor to capture facial expression and the eye activities. We evaluate DADS using 26 participants and have achieved 100% detection rate with good lighting condition and a low detection rate at night.

Presenting a model for dynamic facial expression changes in detecting drivers' drowsiness.:

Drowsiness while driving is a major cause of accidents. A driver fatigue detection system that is designed to sound an alarm, when appropriate, can prevent many accidents that sometime leads to the loss of life and property. In this paper which is proposed by author's, we classify drowsiness detection sensors and their strong and weak points. A compound model is proposed that uses image processing techniques to study the dynamic changes of the face to recognize drowsiness during driving.

III. PROBLEM STATEMENT

Fatigue is a safety problem that has not yet been deeply or impressively tackled by any country in the world mainly because of its nature. Fatigue in general, is not that easy measure or observe unlike alcohol and drugs, which have clear key indicators and tests that are available easily, probably the best solution to this problem are awareness about fatigues related accidents and encouraging the drivers to admit fatigue whenever needed. The former is hard and much more expensive to achieve, and the latter is not possible without the former as driving for long hours is very rewarding.

IV. METHODOLOGY

However, method developed based on image processing are fast and precise to detect driver drowsiness. Drowsiness was detected merely based on PERCLOS. A small camera conducted the observing test detection the levels of drowsiness by the number of eyes blinks and accuracy of 93%. The facial expression, as well as location of the eyes were detected by decision making algorithm. criteria for detecting drivers' level of drowsiness by eyes tracking included eye blink duration blink frequency and PERCLOS that was used to confirm the result.

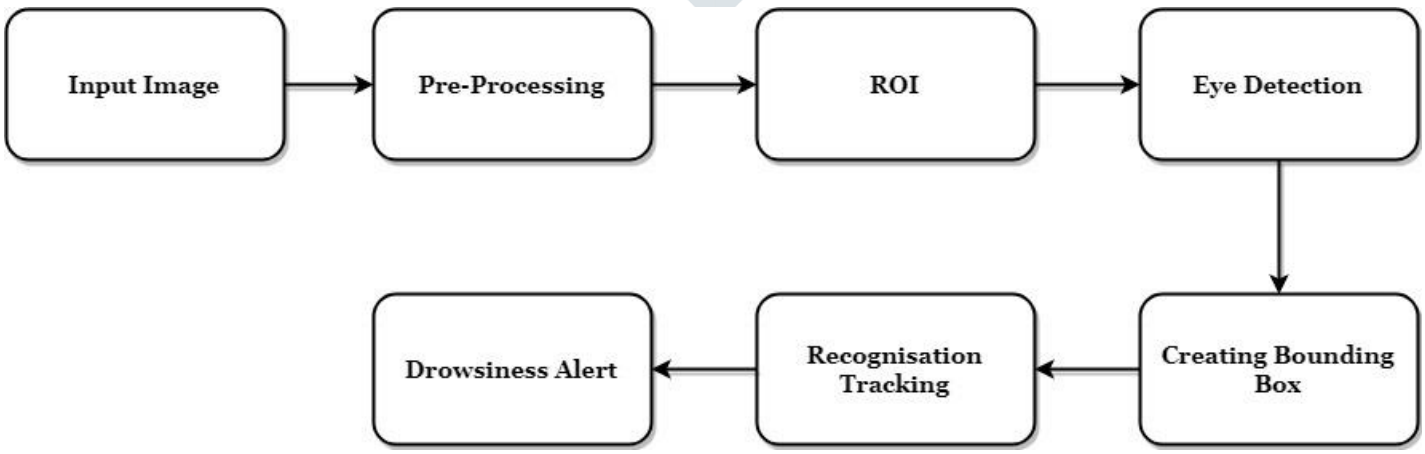


Fig.1. Architecture Diagram

In the above architecture diagram the first send the input image then this image is processing in the region of interest (ROI) then detect the eyes from ROI and feed it to the classifier then classifier will categorize whether eyes are open or closed the calculate score to check whether the person is drowsy. Then the create the bounding box of the image then recognition of tracking then the drowsiness alert.

Input Image:

This block contains the sample images of the driver who is interacting with our system. The images will act as input for our system and they will be helpful to detect the facial expression and also the eye pattern of the driver in question. The images taken are pretty important as they play a major part in output generation. These images are then subjected to image processing, Eigen algorithm etc. for detecting that the driver is drowsy or not.

Pre-processing:

In this block the main focus is on image. In some cases, the image may be distorted or captured incorrectly or it may happen that the image needs to be enhanced as per the need. The process of correcting the missing components in the image or making the required enhancements takes place in this block. It includes operations such as (e.g., rotation, scaling, translation).

ROI (Region of Interest):

Once the face is found its ROI is detected and processed. In the second block the detection of driver drowsiness via eyelid closure takes place. The eye of the driver is continuously monitored and if found closed for a certain period of time the alarm sound.

Eye Detection:

The total count of frames in which eyes are closed are identified. When this number of frames is above a certain threshold, the diver will get a visual warning on the navigation display that points out he is drowsy. Then the alarm will be generated.

Creating Bounding Box:

As we all know a bounding box is an imaginary rectangle that serves as a point of reference for object detection and creates a collision box for that object. Data annotators places these rectangles over images, outlining the object of interest within each image by defining its X and Y coordinates as implemented in our system the imaginary box is created for eye detection and also the collision box is formed with its reference.

Recognition Tracking:

The main face detection, recognition, and tracking features and functions consists of:

Detecting faces

Decoding of an image file and detecting faces on it can be done here.

Recognizing faces

By using example faces you can recognize faces in an image.

Tracking faces

Tracking of faces using the camera preview images, starting from a specific location in the image can be carried out here.

Drowsiness Alert:

This block comes into play or has a role to play specifically when the particular driver is detected drowsy. If the driver is drowsy the process of generating an alert alarm is carried out here.

Eigen Face Recognition Algorithm:

Step 1: Start
Step 2: Original Faces training Set
Step 3: E = eigenfaces (training Set)
Step 4: W=weights (E training Set)
Step 5: input unknown image X
Step 6: Wx=weight (E, X)
Step 7: D = avg (distance {W, Wx})
Step 8: D < 0
Step 9: if {
Step 10: X is a Face then
Step 11: Store X and Wx
Step 12: else
Step 13: X is not face}
Step 14: End

Decision Making Algorithm:

Step 1: Start
Step 2: take image as input from a camera.
Step 4: Detect the face in the image and create a Region of Interest (ROI)
Step 5: Detect the eyes from ROI and feed it to the classifier,
Step 6: Classifier will categorize Whether eyes are open or closed.
Step 7: Calculate score to check Whether the person is drowsy.
Step 8: Stop

In this project we are use the different algorithm of for the different uses purpose. In this face detection purpose, we use the Haar cascade classifier. then eyes detection purpose also Haar cascade classifier is used. then the pupil detection of eyes we use the block algorithm then all this feature we give the decision so the decision purpose we use the decision-making algorithm in these two cases is important first one the persons is drowsy or not if the person is drowsy then the drowsiness system alert the message the person is drowsiness. Then the person is not drowsy the system takes the first condition or the main state.

In this Project we are using the DECISIONMAKING algorithm. In this algorithm of decision making, we define algorithmic decision or simply algorithm as the processing of input data to produce a score or a choice that is used to support decision such as priorities, classification, association, and filtering. This algorithm is used face recognition purpose. if representation of function that takes as a input a vector of attribute values and return a decision a single output values. decision tree algorithm falls under the category of supervision learning they can be used to solve both regression and classification problems. Higher cognitive process is that the process of constructing choices by identifying a decision, gathering information and accessing alternative resolution.

Mathematical Model: -

I= {I1, I2, I3, I4……. In}
I as a set of Inputs.
I1 = Face image.
F= {F1, F2, F3, F4……. Fn}
Where F is a set of Function.
F1 = Detection of Face.
F2 = Detection of Eyes.
F3 = Extract Pupil.
F4 = Detect Eyes Aspect Ratio.
F5 = Detect Drowsiness.
O = is a set of Output.
O1 = Detection of Drowsiness.

V. DESIGN AND IMPLEMENTATION

The framework is formed utilizing the incremental model. The Centre model of the framework is first created and afterwards augmented during this way within the wake of testing at each turn. The basic undertaking skeleton was refined into expanding levels of capability. At the subsequent incremental level, its incorporated new execution backing and improvement. In our project we used Haar cascading and Eigen algorithm. After passing our video feed to the dib frame by frame, we are able to detect left eye and right eye features of the face. Now we have drew contours around it using OpenCV. We calculated sum of both eyes ratio which is that the sum of two distinct vertical distance Between the eyelids divided by its horizontal distance. Now we check if ratio value is a smaller amount than 0.25 if it's less an alarm is sounded a user is warned. Drowsiness detection system created to scale back the chance of accident while driving the system will record image of driver then face and eyes are detected results of eyes detection each frame are going to be analysed if eyes are closed for 4 second

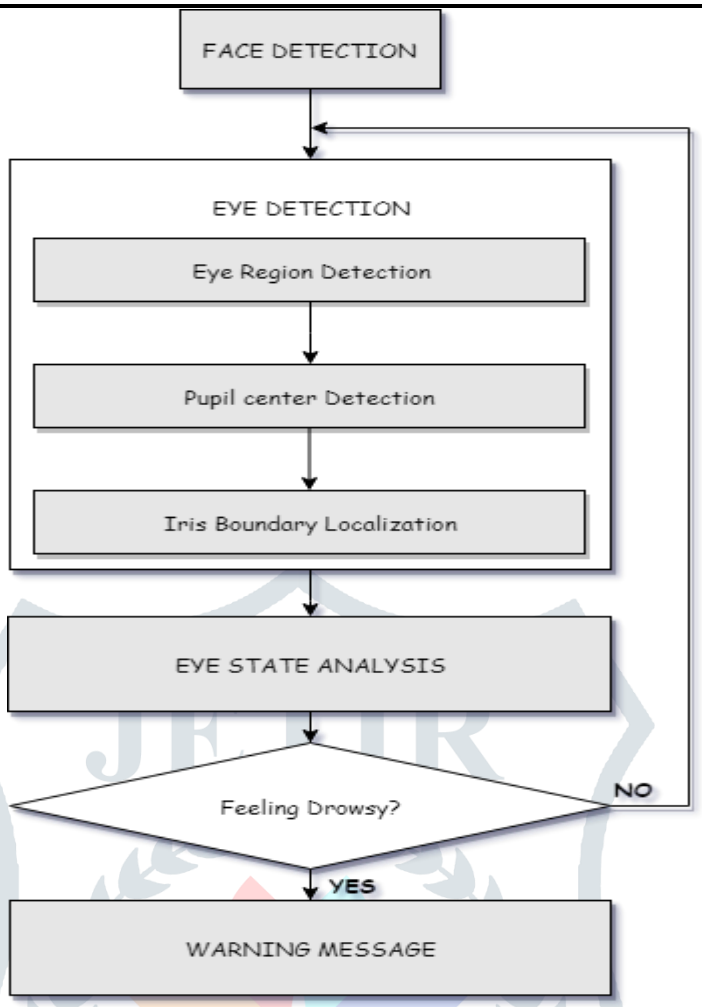
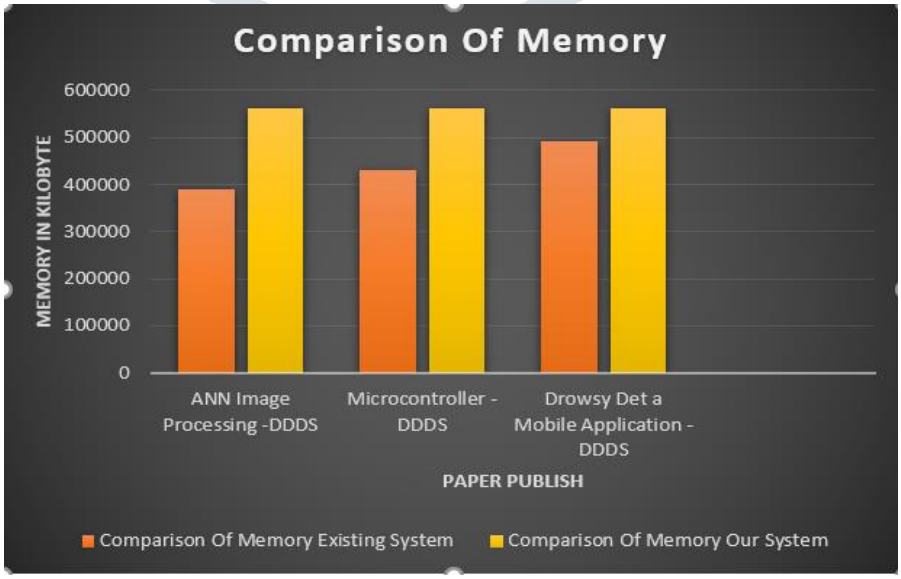
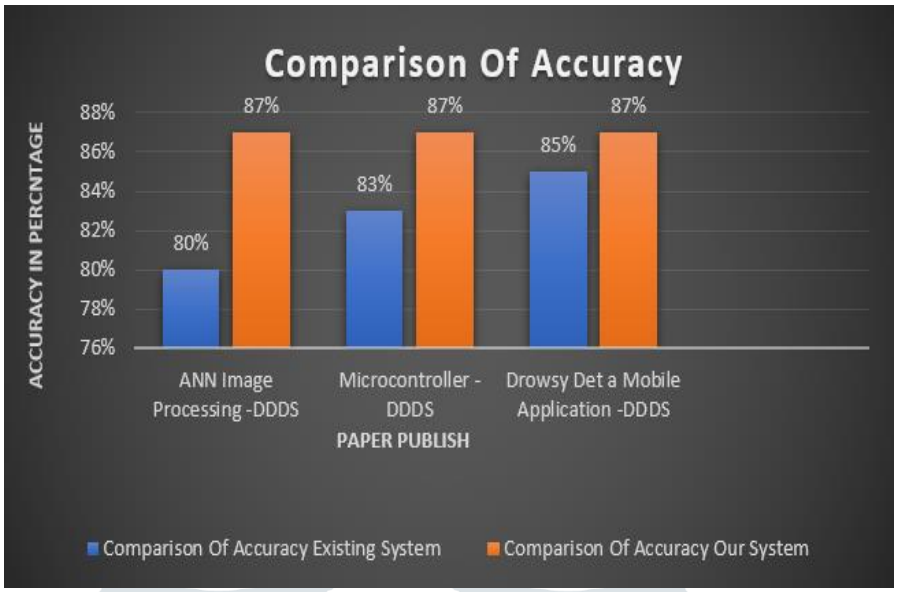
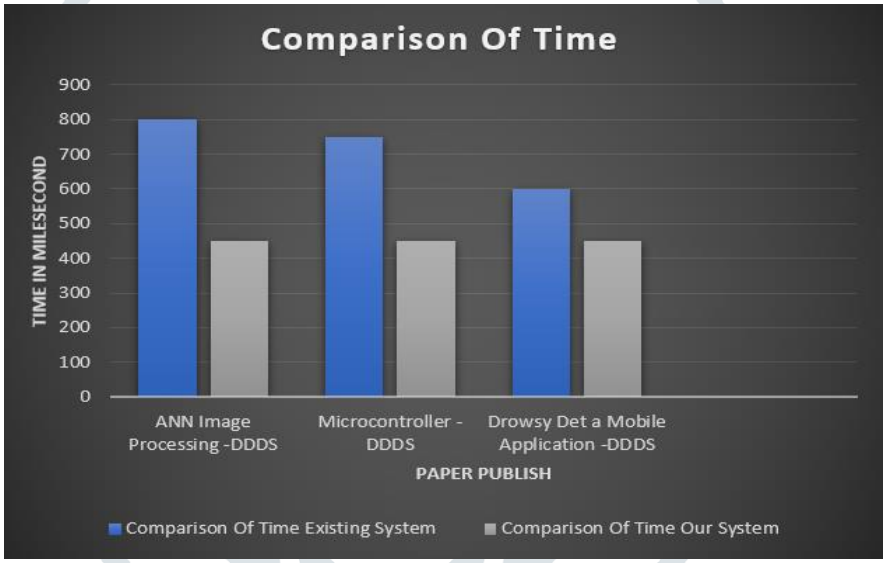


Fig 2: Block Diagram







VI. CONCLUSION

It completely meets the objectives and requirements of the system. The framework has achieved an unfaltering state which has caused the disposal of bugs. The framework cognizant clients who are familiar with the framework and comprehend its focal points and the fact that it takes care of the issue of stressing out for individuals having fatigue related issues to inform them about the drowsiness level while driving.

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