



Detection of Driver's Alertness

Dr.G.V. Patil¹, Associate Professor, pganeshv@gmail.com¹,

Ms. Komal R. Yadav² Ms. Poonam K. Mali³ Ms. Megha M. Patil⁴, Ms. Ms. Priyanka B. Sodage⁵ Sakshi S. Shaha⁶,

DYPCET, KOLHPUR

Abstract

Our system aims to address the issue of drowsiness of driver by using Webcam which monitors his face and detect drowsiness. It includes the MediaPipe library, which helps to detect facial detection, including the Eye Aspect Ratio (EAR) and Mouth Aspect Ratio (MAR) algorithms. The EAR algorithm is used to detect eye landmarks and calculate a ratio that indicates if the driver's eyes are closing, which shows drowsiness. The MAR algorithm, focuses on movements of the driver's mouth such as yawning that shows drowsiness. By continuously observing the driver's face using a webcam it can use these algorithms to detect and analyses eyes and mouth. Based on given conditions, such as a certain EAR or MAR value, the system can determine if the driver is showing symptoms of drowsiness. When drowsiness is detected, the system can activate an alert such as alarm or a through a speaker to alert the driver. This alert serves as a reminder to the driver to stay awake and focused, so that the risk of accidents can be decreased. such systems can be helpful in increasing transportation safety and should be used in with other metrics like regular breaks, sufficient sleep, and using traffic rules.

I. Introduction

Every year there is 1.24 million traffic accidents with several reasons in which 2.4% accidents are caused due to drowsy drivers. The main cause that leads to road accidents in India and worldwide is because of drowsiness of driver which can be avoided by taking effort to get proper rest before driving, drinking energy drinks or coffee, or taking a break when a person feels drowsy.

The Causes of Road accident

- 1) Speed: At the highway most of the truck driver's cross their speed limit which causes the accidents.
- 2) Drunk Driving: While driving the vehicle, if driver is drunk he will lose the ability to focus, so eventually accident will happen.
- 3) Driving at Night: Driving at daylight can be dangerous, but it can be too risky because other vehicles headlight will be disturbing to the eyes of driver.
- 4) Drowsy Driving: Because of long and continuous driving, driver feels drowsy or tired.

Therefore, we are developing system to check drowsiness of drivers while they're driving. The technology recognizes the face from camera. The main goal is to identify the eyes and mouth inside the face region, the face area is detected.

Detecting the mouth and eyes is the next step after finding the face.

II. Literature Survey

In last few years, there is increase in road accidents in India and all over the world. The common reasons for the same are drowsiness. Therefore, driver drowsiness detection is possible area to prevent road accidents. In research paper [1] author proposes different methods for Driver Drowsiness Detection System applicable in motor vehicles. The system checks blink rate, eye closure and yawning to identify the drowsiness while driving the vehicle and ring alarm.

The paper [2] describes, how to find eyes, and determines status of the eye are open or closed. An application of Viola Jones algorithm is used for face detection and tracking. The Haar like feature is develop, which was primary objective of the project.

The research [3] is primarily devoted to maximizing try to check drowsiness and behavior of driver while driving. The system [4] is developed to alert the driver. It uses different techniques for drowsiness detection which includes physical-based techniques which detects Eyes state and Yawning. Another which uses physiologically based technique which detects EEG and ECG signals, Heart Rate to check drowsiness of driver.

III. Need of the Work

Today, due to private mode of transportation there is increase in traffic. It will be boring for drivers for long distance travelling. The main reason of driver's lack of alertness is long distance travelling without rest and sleep. This leads to get drowsy for driver while travelling. Drowsiness comes in dangerous accidents that leads to death also. To prevent these accidents, it is necessary to monitor the driver continuously and when driver becomes drowsy, gives them alert. So that the number of accidents will be reduced and lives of people can be save.

Drowsiness lead the cause of road accidents. Thus, Detection of Driver's Alertness is being introduced to minimize and reduce the number of accidents involving lorries and trucks. It detects the drowsiness signs and alerts drivers when they are in drowsy state. Detection of driver's drowsiness is possible way which prevents the accidents that are caused by driver's who fell asleep while driving.

IV. Objectives

The main objectives of this project are:

- To detect drowsiness of the driver using the webcam.
- To recognize face of driver.
- To calculate eye and mouth aspect ratio.
- To alert driver by warning messages and alarm in case of drowsiness detection

V. System Architecture

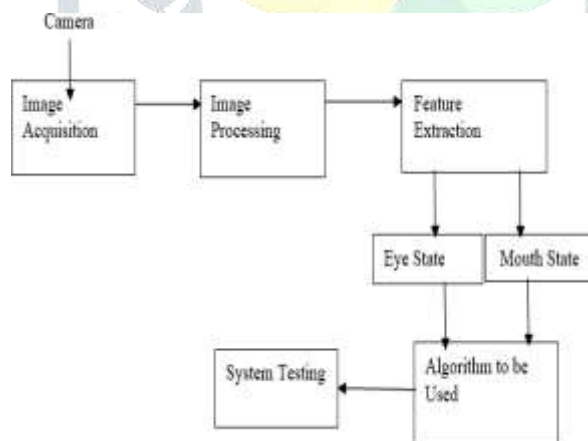


Fig 1. System Architecture Diagram

VI. Detailed Data Flow Diagram

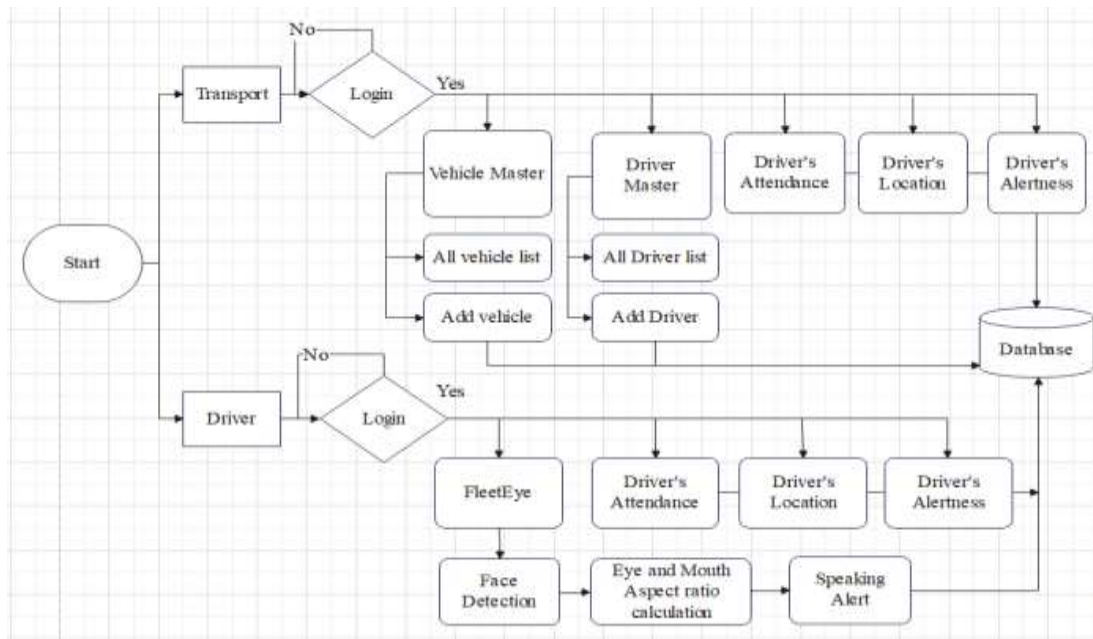


Fig 2. DFD of System

VII. Project Modules

1. Transport Module

- In this module transport admin can add the vehicles as well as drivers as per requirements.
- He can see the all driver's attendance and their location.
- And also in emergency admin can give the emergency alert to the driver.

2. Driver Module

- In this module when driver's login into system, webcam will be started for face detection and their location tracker will be also started.
- As per driver's mouth and eye aspect ratio, the driver will get the speaking alert.
- Driver also can mark their attendance.

VIII. Experimental Details and Setup

When driver login into the System through the mobile the webcam and location tracking will be started automatically:

- By calculating eye and mouth aspect ratio, driver's drowsiness is detected.
- If driver is detected as drowsy then speaking alert will be given to driver.
- If driver doesn't respond, then emergency trigger will be given.

IX. Basic Concept and Technologies used:

1. MediaPipe

It is a framework to build machine learning pipelines to process time-series data like video, audio, etc. It works on cross-platform Framework works on Desktop/Server, Android, iOS, and embedded devices like Raspberry Pi and Jetson Nano. It detects faces that are in image or video. It also locates facial features in a frame. It works on images which run in continuous stream. It has 468 face land marks in 3D with multiface support. The output after using media pipe is left eye, right eye nose tip, mouth, left eye trigion and right eye trigion.

2. Geolocation API

Geolocation API is a service that accepts HTTPS requests for mobile and Wi-Fi access to content that mobile users can capture. Returns the latitude/longitude coordinates and radius showing the exact result for each possible application.

3. Apache Server

XAMPP is a cross-platform web application for developing and testing services on a local server. It is developed and maintained by Apache Friends

and is open source. It has an Apache HTTP server, MariaDB, and translators for 11 different languages such as Perl and PHP.

XAMPP stands for Cross Platform, Apache, MySQL, PHP and Perl.

- Allows you to create a website on your computer's local website.
- Store local information.

4. Algorithms:

1. OpenCV –

OpenCV stands for Open Source Computer Vision. It is a popular Computer Vision library used to develop applications using C and C++. The main use is detection of objects and video processing. Benefits of OpenCV are real time object detection, movement recognition, face recognition etc. It is a cross platform library to develop Computer Vision applications.

2. Random Forest

Random forest is a popular machine learning algorithm that belongs to the supervised learning process. It can be used for both classification and regression problems in machine learning. It is based on the concept of ensemble learning, which is the process of combining multiple classifiers to solve complex problems and improve model performance. As the name suggests, "A random forest is a distribution with many decision trees on various subsets of the given data, which are averaged to improve the accuracy of the data.



Figure 3 Snapshots of Feature Extraction

References

- [1] Reshma, Aishwarya et.al, "International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS)", Volume IX, Issue XI, November 2020
- [2] Arman Shaikh, "International Journal of Computer Science and Engineering (IJCSE)", Vol. 2, Issue 4, Sep 2013
- [3] Swapnil Titare, Shubham Chinchghar et., "International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS)", Volume 7, Issue 3, May-June 2021
- [4] Marwa K. Hussein, Tariq M. Salman, et., "IEEE", 12 August 2021