DRIVER DROWSINESS DETECTION ALGORITHM USING MACHINE LEARNING ALGORITHM

Submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering

By

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **M.NAVYASREE (37130229)** and **GITIKA JAIN(37130142)** who have done the Project work as a team who carried out the project entitled **"DRIVER DROWSINESS DETECTION USING MACHINE LEARNING ALGORITHM"** under my supervision from December2020 to April 2021.

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We **M.NAVYASREE (37130229), GITIKA JAIN(37130142)**hereby declare that the Project Report entitled **"*DRIVER DROWSINESS DETECTION USING MACHINE LEARNING ALGORITHM*"** done by us under the guidance Dr.S.POORNAPUSHPAKALA at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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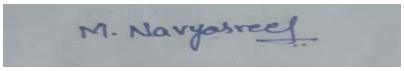

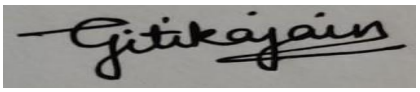

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ABSTRACT

Consistently numerous individuals lose their lives because of deadly street mishaps all throughout the planet and sleepy driving is one of the essential drivers of street mishaps and demise. Weariness and microsleep at the driving controls are frequently the underlying driver of genuine mishaps. However,initial signs of fatigue can be detected before a critical situation arises and therefore, detection of driver's fatigue and its indication is an ongoing research topic. The vast majority of the conventional techniques to identify tiredness depend on social viewpoints while some are meddling and may divert drivers, while some require costly sensors. Consequently, in this,Project a light-weight, continuous driver's tiredness identification framework is created and carried out in an application. The framework records the recordings and distinguishes the driver's face in each casing by utilizing picture handling procedures.The system is capable of detecting facial landmarks, computes Eye Aspect Ratio (EAR) and Eye Closure Ratio (ECR) to detect driver's drowsiness based on adaptive thresholding. Machine learning algorithms have been employed to test the efficacy of the proposed approach. Empirical results demonstrate that the proposed model achieved an accuracy of 84% using machine learning algorithms.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Driver fatigue is a critical factor in endless mishaps. Late estimations measure that yearly 1200 passing's and 76,000 injuries can be credited to exhaustion related accidents. Driver sluggishness and weariness is a main consideration which brings about various vehicle mishaps. Creating and keeping up innovations which can viably recognize or forestall sluggishness in the driver's seat and alarm the driver before a disaster is a significant test in the field of mishap avoidance frameworks. Due to the threat that laziness can cause on the streets a few techniques should be produced for forestalling checking its belongings. With the coming of present day innovation and continuous filtering frameworks utilizing cameras we can forestall significant disasters out and about by cautioning vehicle drivers who are feeling lazy through a languor location framework. The mark of this endeavor is to develop a model languor recognition framework. The spotlight will be put on arranging a system that will unequivocally screen the open or shut state of the driver's eyes constantly. By observing the eyes, it's accepted that the side effects of driver weakness are frequently recognized early enough to stay away from a fender bender. Location of exhaustion includes the perception of eye developments and squint examples during a grouping of pictures of a face.

There are location frameworks planned dependent on estimation of driver's tiredness, which can be observed by camera. The conduct based strategy identifies languor utilizing picture preparing on a driver's facial developments caught by cameras.

1.2 OBJECTIVE

Nowadays the driver’s safety in the car is one of the most wanted systems to avoid accidents. Our goal of the undertaking is to ensure the security framework. For upgrading the wellbeing, we are identifying the eye flickers of the driver and

assessing the driver's status and controlling the vehicle likewise. The venture primarily centers around these targets:

1. To recommend approaches to recognize exhaustion and sleepiness while driving.

2. To examine eyes and mouth from the video pictures of the members in the trial of driving reenactment led by MIROS that can be utilized as a marker of exhaustion and tiredness.

3. To examine the actual changes of weariness and laziness.

4. To build up a framework that utilizations eye conclusion and yawning as an approach to distinguish exhaustion and laziness.

5. Speed of the vehicle can be decreased.

6. Traffic the executives can be kept up by decreasing the mishap.

1.3 SIGNIFICANCE OF THIS PROJECT

Sleepiness and weariness are the reason for street mishaps in Malaysia. Accordingly, Driver's Drowsiness Detection by utilizing a webcam is being acquainted with limit and decrease the quantity of mishaps including vehicles, Lorries, and trucks.

It recognizes languor and cautions the drivers when they are in lazy state.

1.4 BACKGROUND OF STUDY

Consistently there is an extension in road disasters cases including vehicles and significant vehicles like vehicles, Lorries and trucks. Languor and weariness conditions are one of the phenomenal factors adding to road setbacks. Driving in this condition may achieve dreadful causes since it impacts the driver's judgment in

obsession. Falling asleep on the wheel can be avoided if the drivers take tries like getting adequate rest before driving, taking caffeine or stop for quite a while to rest when the signs of exhaustion and laziness appear. Regardless, all around drivers won't require one among these methods even once they understand that they're impacted by exhaustion, and can continue to drive.

In like manner, distinguishing sleepiness is urgent together of the way to stop the road incidents. This endeavor recommended that yawning and eye distinguishing proof are the obvious signs of exhaustion and sluggishness.

1.5. PROBLEM STATEMENT

Planning a model Drowsiness Detection framework which will zero in on ceaselessly and precisely observing the condition of the driver's eyes continuously to check whether they are open or shut for in excess of a given timeframe.

Flow sluggishness identification frameworks checking the drivers condition demands complex calculation and costly gear, not happy to wear during driving and isn't appropriate for driving conditions, For instance Electroencephalography (EEG) and Electrocardiography (ECG),i.e., distinguishing he mind recurrence and estimating the cadence of heart, individually.

A driver laziness discovery framework which utilizes a camera set before the driver is more appropriate to be utilized yet the actual signs that will show languor should be found first in order to return up with a sleepiness identification calculation that is solid and exact. Lightning power and keeping in mind that the driver slants their face left or right the issues happen during recognition of eyes and mouth locale.

1.6 SYSTEM REQUIREMENTS

EQUIPMENT REQUIREMENTS:

PC, Camera, Monitor, Alarm, Mouse, Keyboard, Buzzer, Raspberry pi.

SOFTWARE REQUIREMENTS;

Open CV, dilib, and Python.

The camera catches the picture and sends the processor of the PC which comprises of a 32 bit memory card introduced with OpenCV which helps in picture handling. On the off chance that the sign passes the boundary of a bunch of persistent casings with EAR not as much as limit esteem, it will naturally make the alert blare and the speed of the vehicle gets diminished. In any case that sign is dismissed and the following sign is handled.

1.7 WORKING

Drivers' appearances are noticed all through using a video or web camera. To distinguish the tiredness the underlying advance is to perceive the face using the plan of edges taken by the camera. By then the space of the eyes is distinguished and the retina of the eye is reliably noticed.

The got picture is delivered off the processor for picture taking care of. It changes the got picture over to cutting edge sign using OpenCV. The high level sign is sent from transmitter to the Receiver; both the transmitter and the gatherer are coordinated up. The sign is then passed to the LPC2148, the microcontroller. If the sign passes the limit assessment of EAR for a given number of edges, by then the alert signs and the speed of the vehicle is normally diminished**.**

1.8 ORGANISATION OF THE PROJECT

The report is separated into six sections. Part 1 is a concise presentation about the undertaking. It tells about the targets, importance, Background of the examination, issue explanation, prerequisites of working. Part 2 is top to bottom examination of all the Research papers and reports that were utilized in the making of this task. Section 3 is about the point and extent of the task. Section 4 is an exploratory examination of how the undertaking will be functioning when put under different

experiment situations. Part 5 shows every one of the outcomes and conversations in regards to the undertaking and all the investigation is introduced in this section. Section 6 shows the synopsis and ends.

CHAPTER 2

LITERATURE SURVEY

There are numerous past investigates in regards to driver sleepiness location frameworks that can be utilized as a source of perspective to build up a constant framework on identifying laziness for drivers. There are likewise a few techniques which utilize various ways to deal with distinguish the sluggishness signs.

As indicated by MIROS (Malaysia Institute of Road Safety), from the time of 2007 until 2010, there were 439 instances of street mishaps that have been explored by the MIROS Crash group. The part presents the writing overview of laziness identification draws near. As per the study on driver Fatigue-Drowsiness Detection framework, yawning inclination, squint of eyes territory extraction and so forth.

There are numerous examinations finished with an open CV for android likewise which is accessible for modest cell phones too. Different analyses directed have brought about most extreme exactness when the camera was arranged at various areas. OpenCV is overwhelmingly a method for ongoing picture preparing which has liberated from cost executions on most recent PC vision calculations. It has all necessary PC vision calculations.

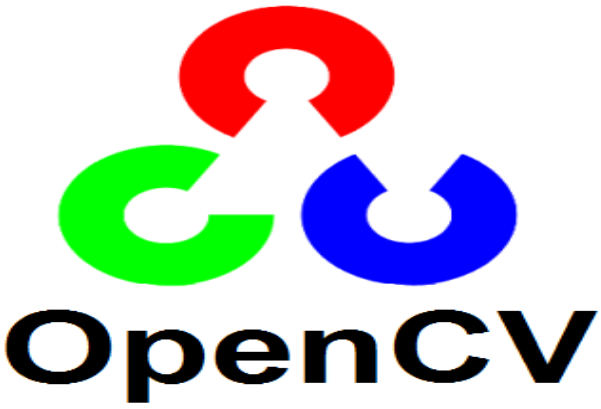

FIG 2.1:OpenCV library

AUTHOR	YEAR OF PUBLICATION	TITLE	METHODLOGY	INFERENCE
A.Sahayadhas, K.Sundaraj, M.Murugappa	2018	Detecting driver drowsiness based on sensors	Complete information process is done under algorithm and system compares to the value.	In this calculation, the framework holds data about the edges on the grounds that the eye squinting estimations from an assortment measure of edges are utilized to screen the tiredness
Y.Dong, Z.Hu, K.Uchimura and N.Murayama	2020	Driver inattentation Monitoring system for intelligent vehicles	He uses infrared rays to detect drowsiness and more than 80% of test results were passed	This licenses continuous languor identification and empower the framework interaction a whole 720*576frames at 16.7 miniature seconds
C.Billa, F.Sivrikaya, M.A. Khan and S. Albayrak	2020	Vehicles of the future	Detects driver particularly and records data and produces alarm	This permits real time drowsiness detection and enable the syste

2.1 DROWSINESS AND FATIGUE

Antoine Picotiter, expressed that tiredness is the place where an individual is in an alert and drowsy state. The present circumstance drives the driver to not focusing on their driving. Subsequently, the vehicle can presently don't be controlled because of the driver in a semi - cognizant state. As per Gianluca Borghini etal, mental exhaustion is a factor of tiredness and it causes the individual who encounters to not have the option to perform on the grounds that it diminishes the proficiency of the mind to react towards unexpected occasions.

2.2 ELECTROENCEPHALOGRAPHY (EEG) FOR DROWSINESS DETECTION

•Electroencephalography (EEC) is a strategy that actions the mind electrical movement. It tends to be utilized to quantify the heartbeat, eye squint and surprisingly major actual development, for example, head development. It very well may be utilized on people or creatures as subjects to get the cerebrum movement. It utilizes a unique equipment that places sensors around the highest point of the head territory to detect any electrical cerebrum action.

•Authors referenced that from the technique that has been carried out by the past specialist to identify sleepiness signs, the EEG strategy is ideal to be applied for tiredness and weariness recognition. In this technique, EEG has four sorts of recurrence segments that can be examined, i.e., alpha, beta and delta. At the point when the force is expanded in alpha and delta recurrence groups it shows that the driver is confronting weariness and sleepiness.

•The hindrances of this strategy are, it is exceptionally delicate to commotion around the sensors. For instance, when the individual is doing the EEG explore; the encompassing territory should be totally quiet. The commotion will meddle with the sensor that identifies the mind action. Another weakness of this technique is that regardless of whether the outcome may be precise it isn't reasonable to use for genuine driving application. Envision when an individual is driving and he is wearing something on his head brimming with wires and when the driver moves their head, the wire may take off from their places. Despite the fact that it isn't advantageous to be utilized for ongoing driving however for try purposes and information assortment, it is probably the best strategy up until now.

2.3 DROWSINESS DETECTION USING FACE DETECTION SYSTEM

Sleepiness can be distinguished by utilizing face territory recognition. The techniques to identify sleepiness inside the face territory shift because of languor. Sign in are more noticeable and clear to be identified at the face territory, we can identify the eyes area. From eyes identification, the creator expressed that there are four kinds of eyelid development that can be utilized for laziness location. They are totally open, total close, and in the center where the eyes are from open to close and the other way around.

The calculation measures the picture caught in a dark scale strategy; where the tone from the pictures is then changed into highly contrasting. Working with highly contrasting pictures is simpler on the grounds that lone two boundaries must be estimated. The creator at that point plays out the edge discovery to identify the edges of eyes so the estimation of the eyelid territory can be determined.

The issue happening with this technique is that the size space of the eye may shift starting with one individual then onto the next. Somebody may have little eyes and appears as though it is drowsy yet some are most certainly not. Other than that, if the individual is wearing glasses there is a hindrance to distinguish eye area. The pictures that are caught should be in a specific reach from the camera since when the distance is a long way from the camera, the pictures are obscured.

FIG 2.2: Drowsiness Condition

2.4 PERCLOS (PERCENTAGE OF EYE CLOSURE)

•Drowsiness can be caught by recognizing the eye squints and level of eye conclusion (PERCLOS). For eye squint identification, propose a strategy which learns the example of span of eyelid shut. As per this proposed technique estimates the ideal opportunity for an individual shut their eyes and on the off chance that they are shut longer than the ordinary

Eye flicker time, it is conceivable that the individual is nodding off. It is referenced that eye flicker time, it is conceivable that the individual is nodding off. It is referenced that almost 310.3ms are the normal of an ordinary individual's eye squint.

FIG 2.3 : Fatigue Condition

Subsequent to going through the exploration papers and the current techniques, this task suggested that eyes and yawning location strategies will be utilized. Eye flicker term gives the information that the more extended the individual's nearby their eyes, the drowsier it.

•PERCLOS technique recommends that languor is estimated by ascertaining the level of the eyelid 'hangs'. Sets of eye open and eye shut have been put away in the product library to be utilized as a boundary to separate whether the eyes is completely open or completely shut. For eyelids to hang, it occurs in much more slow time as the individual is gradually nodding off. Consequently, the progress of the driver's laziness can be recorded.

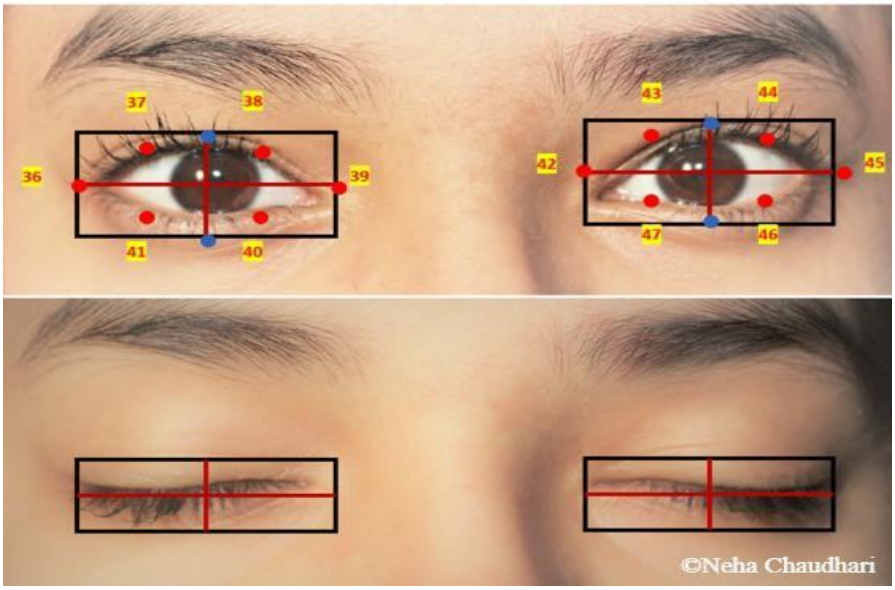

FIG 2.4 : Difference between the eye marks when the eyes are open and the eyes are closed

In this way, PERCLOS strategy puts a corresponding worth where when the eyes is 80% shut, which it is almost to completely close, it accepts that the driver is lazy.

This technique isn't advantageous to be shut to be utilized progressively driving as it needs a fixed limit estimation of enlightening for the PERCLOS strategy to Perform precisely. The two strategies to distinguish tiredness utilizing eye flicker example and PERCLOS have a similar issue where the camera should be put at a particular point to get a decent picture of video with no aggravation of eyebrow and shadow that cover the eyes.

2.5 YAWNING DETECTION METHOD

• As per, sleepiness of an individual are regularly seen by watching their face and conduct. The creator proposes a way where laziness are regularly identified by month situating and thusly the pictures were prepared by utilizing a course of classifiers that has been proposed by Viola - Jones for faces. The photos were contrasted and the arrangement of pictures information for mouth and yawning. A few group will close their mouth with their hand while yakking.

It is an impediment to encourage great pictures if an individual is shutting their mouth while yawning yet yawning is absolutely an image of an individual having laziness and weakness, the examples of yawning location strategy used in the examination.

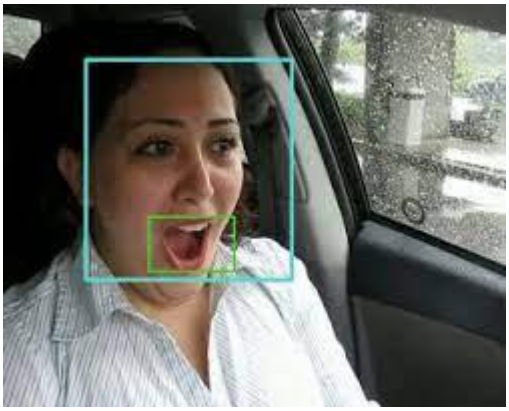

FIG 2.5: Yawning Detection

In the wake of perusing the exploration papers and consequently the current strategies, this undertaking suggested that eyes and yawning location techniques will be utilized. flicker span gives the information that the more extended the individual's nearby their eyes, the drowsier it'll be viewed as it'll be thought of. this is on the grounds that when an individual is during a lazy express; its eyes will be shut longer than the conventional eyes flicker. Besides that, yawning is one among the indications of tiredness where it's ordinary human reaction when yawning is that the sign that they feel lazy or tired.

2.6 TECHNOLOGY USED

•a. PYTHON-Python is a mediator, undeniable level, general - reason programming language. Python's plan theory accentuates code meaningfulness with its outstanding utilization of huge whitespace. Its language builds and article arranged methodology intend to assist software engineers with composing, sensible code for little and enormous scope projects. Python is progressively composed AND upholds numerous programming standards, including procedural, object-situated, and useful programming.

•b. Picture PROCESSING-In software engineering, advanced picture handling is the utilization of PC calculations to perform picture preparing in computerized pictures.

2.7 PACKAGES USED

- OPEN CV
- NUMPY
- PANDAS
- FRAMES
- TENSOR FLOW

2.7.1 Open cv

• Open CV was started at Intel in 1999 by Gary Bradsky, and the chief release turned out in 2000. Vadim Pisarevsky joined Gary Bradsky to manage Intel's Russian programming OpenCV bunch. In 2005, OpenCV was used on Stanley, the vehicle that won the 2005 DARPA Grand Challenge Later, its dynamic headway continued under the assistance of Willow Garage with Gary Bradsky and Vadim Pisarevsky driving the endeavor. OpenCV presently maintains an enormous number of estimations related to Computer Vision and Machine Learning and is broadening bit by bit.

•OpenCV maintains a wide grouping of programming tongues like C++, Python, Java, etc, and is open on different stages including Windows, Linux,OS X, Android,

and iOS. Interfaces for high speed GPU undertakings subject to CUDA and OpenCV are moreover under powerful unforeseen development.

•OpenCV-Python is the Python API for OpenCV, solidifying the best attributes of the OpenCV C++ API and the Python language.

2.7.1.1 OPENCV-PYTHON

•OpenCV-Python is a library of Python attaches planned to handle PC vision issues.

•Python is a comprehensively helpful programming language started by Guido Van Rossum that ended up being standard quickly, generally considering its straightforwardness and code fathomability. It engages the computer programmer to convey musings in less lines of code without diminishing comprehensibility.

•Compared to tongues like C/C++, Python is all the more lethargic. Taking everything into account, Python can be successfully loosened up with C/C++, which grants us to form computationally genuine code in C/C++ and make Python covers that can be used as Python modules. This gives us two advantages: first, the code is practically pretty much as fast as the principal C/C++ code (since it is the genuine C++ code working in establishment) and second, it is easier to code in Python than C/C++. OpenCV-Python is a Python covering for the primary OpenCV C++ execution.

•OpenCV-Python uses Numpy, which is an astoundingly improved library for numerical exercises with MATLAB-style language structure.

This also simplifies it to join with various libraries that use Numpy like SciPyand Matplotlib.

2.7.2 NUMPY

•NumPy is a Python library that gives a basic yet incredible information structure: the n-dimensional cluster. This is the establishment on which practically all the force of Python's information science tool compartment is fabricated, and learning NumPy is the initial step on any Python information researcher's excursion.

•NumPy is an open-source mathematical Python library.

•NumPy contains a multi-dimensional exhibit and network information structures. It very well may be used to play out various numerical procedure on clusters like geometrical, factual and arithmetical schedules. Pandas objects depend vigorously on NumPy objects.

2.7.2.1 WHAT IS NUMPY

•NumPy is a Python library utilized for working with clusters.

•It likewise has capacities for working in the space of straight variable based math, Fourier change, and grids.

•NumPy was made in 2005 by Travis Oliphant. It is an open source venture and you can utilize it unreservedly.

•NumPy represents Numerical Python.

2.7.2.2 WHY USE NUMPY

•In Python we have records that fill the need of clusters, yet they are delayed to measure.

•NumPy expects to give an exhibit object that is up to 50x quicker than conventional Python records.

•The cluster object in NumPy is called ndarray, it gives a ton of supporting capacities that make working with ndarray extremely simple.

•Arrays are regularly utilized in information science, where speed and assets are vital.

2.7.2.3 WHY IS NUMPY FASTER THAN LISTS

•NumPy exhibits are put away at one nonstop spot in memory not at all like records, so cycles can get to and control them productively.

•This conduct is called region of reference in software engineering.

•This is the primary motivation behind why NumPy is quicker than records. Likewise it is advanced to work with the most recent CPU engineering.

2.7.2.4 WHICH LANGUAGE IS NUMPY WRITTEN

•NumPy is a Python library and is composed in part in Python, however the majority of the parts that require quick calculation are written in C or C++.

2.7.3 PANDAS

•Pandas is a Python library. Pandas is utilized to break down information. Learning by perusing.
•Pandas are a quick, amazing, adaptable and simple to utilize open source information examination and control device, based on top of the Python programming language.
•We can perform fundamental procedure on lines/segments like choosing, erasing, adding, and remaining.

2.7.3.1 WORKING WITH PANDAS

Stacking and Saving Data with Pandas at the point when you need to utilize Pandas for information investigation, you'll as a rule use it in one of three unique ways:

•Convert a Python's rundown, word reference or NumPy cluster to a Pandas information outline.

•Open a neighborhood record utilizing Pandas, normally a CSV document, however could likewise be a delimited book record, Excel, and so on.

•Open a distant record or information base like a CSVor a JSONon a site through a URL or read from a SQLtable/data set.

2.7.4 TENSORFLOW

TensorFlow makes it simple for fledglings and specialists to make AI models for work area, versatile, web, and cloud.

•Tensor Flow is a Python library for quick mathematical registering made and delivered by Google. It is an establishment library that can be utilized to make Deep Learning models straightforwardly or by utilizing covering libraries that work on the cycle based on top of TensorFlow.

2.7.4.1 WHY TENSOR FL0W IS USED IN PYTHON

•A tensor is a compartment which can house information in N measurements, alongside its straight tasks, however there is subtlety in what tensors actually are and what we allude to as tensors practically speaking.

2.7.4.2 WHAT IS TENSORFLOW AND HOW IT IS USED

•Created by the Google Brain group, Tensor Flow is an opensource library for mathematical calculation and huge scope AI. TensorFlow packages together a huge number of AI and profound learning models and calculations and makes them helpful via a typical analogy.

2.7.4.3 WHY IS IT CALLED TENSORFLOW

The name TensorFlow gets from the tasks that such neural organizations perform on multidimensional information exhibits, which are alluded to as tensors. During the Google I/O Conference in June2016, Jeff Dean expressed that 1500 stores on GitHub referenced Tensor Flow, of which just 5 were from Google.

2.7.4.4 WHAT IS TENSORFLOW BACKEND

•It doesn't deal with low-level activities like tensor items, convolutions, etc. All things considered, it depends on a particular, all around enhanced tensor control library to do as such, filling in as the "backend motor" system created by Google.

CHAPTER 3

AIM AND SCOPE OF THE PRESENT INVESTIGATION

3.1 AIM

•To plan a framework that will recognize tiredness and find essential ways to stay away from mishaps. The driver's languor identification framework, being carried out in this task targets being effectively accessible and can be utilized with various sorts of vehicles.

3.2 OBJECTIVES

•Choosing appropriate programming for picture preparing.
•Design appropriate calculations for weariness acknowledgment.
•Design a framework to control the brake and enact a caution through Raspberry Pi.
•Design a model for driver's sluggishness location framework.
•Testing and result examination.

3.3 SCOPE

•The exhaustion location framework in this task runs on Python and is equipped for distinguishing tiredness on driver's and afterward dependent on the flow circumstance will both stop the vehicle totally and alert the driver utilizing a caution.

3.4 LIMITATIONS

The exhaustion location in this undertaking is finished utilizing Image Processing and Computer vision strategies.

•The calculation that is utilized to recognize the eyes, delivers a high precision when tried with wearing displays, which is a significant disadvantage.

•Tilting the head downwards additionally causes error in exhaustion identification.

•Python, the product utilized for picture preparing in this undertaking, burns-through a great deal of time to deal with constant recordings.

3.5 MOTIVATION

•Every year various people lose their lives as a result of destructive road setbacks all through the planet and languid driving is one of the fundamental drivers of road accidents and passing.

•Fatigue and smaller than expected rest at the driving controls are often the fundamental driver of certifiable setbacks.

•Therefore, identification of driver's weakness and its sign is the fundamental objective.

CHAPTER 4

MATERIALS AND METHODS

•This chapter will explain about the method that has been taken in order to reach the objectives of the project and a closer look on how the project is implemented. It is the analysis of each stage that will be faced in order to complete this project. Each selection and achievement of the method taken that has been implemented in this project will be explained for each stage until the project is successful.

4.1 RESEARCH METHODOLOGY

•Usually, research methodology refers to a set of procedures that will be used to carry out certain research. In order to complete this project systematically within the specified time, there are some methodologies and activities that need to be planned and followed consistently.

4.2 COMPUTATIONAL ANALYSIS

4.2.1 Matching

Dashboard mounted cameras are used to monitor the eyes of the driver in real time to detect drowsiness.

4.3 DROWSINESS DETECTION DESIGN

A camera is set up that looks for faces in the input video stream and monitors frames of faces. In the event that a face is identified, facial milestone identification is connected and the eye districts removed from the edges of the video stream.
Based on the work by Soukupova and Cech in their 2016 paper Real-Time Eye Detection Using Facial Landmarks, we can then derive an equation that reflects this relation called eye aspect ratio (EAR).

EAR=||P2-P6||+||P3-P5||÷2‖P1-P4‖

Where p1, p2,… ..p6 are 2D facial milestones areas.

The numerator of this condition registers the distance between the vertical eye milestones while the denominator figures the distance between flat eye tourist spots, weighting the denominator around since there is just one bunch of level focuses yet two arrangements of vertical focuses.

On the off chance that the angle proportion of the eye shows that they have been shut for more than a committed fixed time, we will sound an alert framework so the driver awakens. We notice the viewpoint proportion of the eye stays consistent for a while demonstrating that the eye was open, at that point it falls quickly to nothing and afterward increments again which shows the individual flickered.

We will be noticing this eye angle proportion in our laziness identifier case to check whether the worth remaining parts consistent or tumbles to zero yet not increments again inferring that the driver has shut his eye for an all-encompassing period.

4.4 EXPERIMENTAL ANALYSIS

In this stage, it was tracked down that perhaps the most ideal approaches to distinguish eyes and yawning is by calculation. A portion of the current calculations that are identified with this undertaking are inspected to help build up the task. The reason strategy estimates the ideal opportunity for an individual to close its eyes and if its eyes are shut longer than the typical eye squint time, it is conceivable that the individual is nodding off. In light of investigates of natural eye flickers, it has been recognized that the normal of human squint term takes about 202.24ms while the flicker length of a lazy individual takes about 258.57ms

In the wake of characterizing the strategy to be utilized in this undertaking, creators get the video of the investigation led by MIROS where members are driving in a reproduced climate and being recorded for the entire meeting.

The examination requires significant investment, around 60 to an hour and a half. The investigation of sluggishness recognition is done physically by watching the full length of the video and discounting the languor signs. The boundaries of the information are: sluggishness, yawning and different signs happening at beginning and finishing time.

4.5 BLOCK DIAGRAM

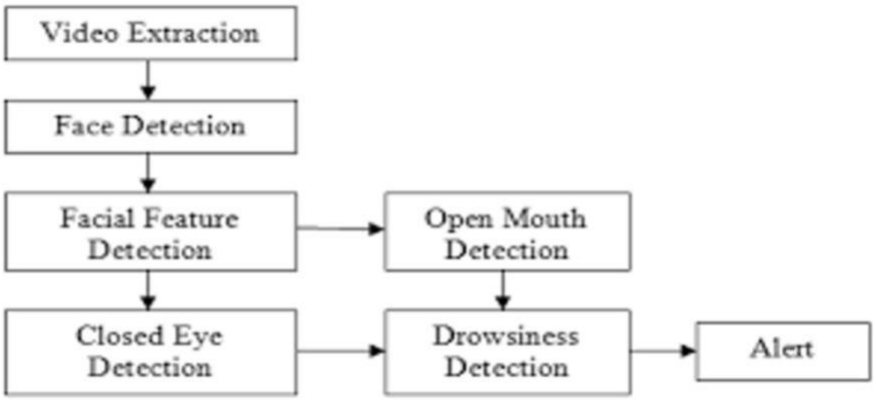

FIG 4.1: Block diagram of alert indication

The numerator of this condition registers the distance between the vertical eye milestones while the denominator processes the distance between level eye tourist spots, weighting the denominator roughly since there is just one bunch of flat focuses yet two arrangements of vertical focuses.

In the event that the viewpoint proportion of the eye shows that they have been shut for more than a committed fixed time, we will sound an alert framework so the driver awakens. We notice the perspective proportion of the eye stays consistent for a while demonstrating that the eye was open, at that point it falls quickly to nothing and afterward increments again which shows the individual flickered. We will be observing this eye aspect ratio in our drowsiness detector case to see if the value remains constant or falls to zero but not increases again implying that the driver has closed his eye for an extended period.

4.6 TOOLS / MATERIALS

A couple of instruments have been utilized to identify the face and further concentrate the eye and mouth district.
Utilized as a device to catch pictures of the driver face prior to narrowing it down to the eye area and mouth.

In this stage, it was tracked down that perhaps the most ideal approaches to identify eyes and yawning is by calculation. A portion of the current calculations that are identified with this undertaking are explored to help build up the task. The reason strategy estimates the ideal opportunity for an individual to close its eyes and if its eyes are shut longer than the typical eye squint time, it is conceivable that the individual is nodding off. In light of explores of natural eye flickers, it has been recognized that the normal of human squint term takes about 202.24ms while the flicker span of a tired individual takes about 258.57ms

Subsequent to characterizing the strategy to be utilized in this task, creators get the video of the analysis directed by MIROS where members are driving in a recreated climate and being recorded for the entire meeting.

The investigation requires some serious energy, around 60 to an hour and a half. The investigation of languor location is done physically by watching the full length of the video and discounting the sleepiness signs. The boundaries of the information are: languor, yawning and different signs happening at beginning and finishing time.

We notice the angle proportion of the eye stays consistent for a while demonstrating that the eye was open, at that point it falls quickly to nothing and afterward increments again which shows the individual flickered.

Contrasted with dialects like C/C++, Python is more slow. All things considered, Python can be effectively stretched out with C/C++, which permits us to compose computationally concentrated code in C/C++ and make Python coverings that can be utilized as Python modules. This gives us two benefits: first, the code is just about

as quick as the first C/C++ code (since it is the real C++ code working in foundation) and second, it is simpler to code in

4.7 FLOWCHART

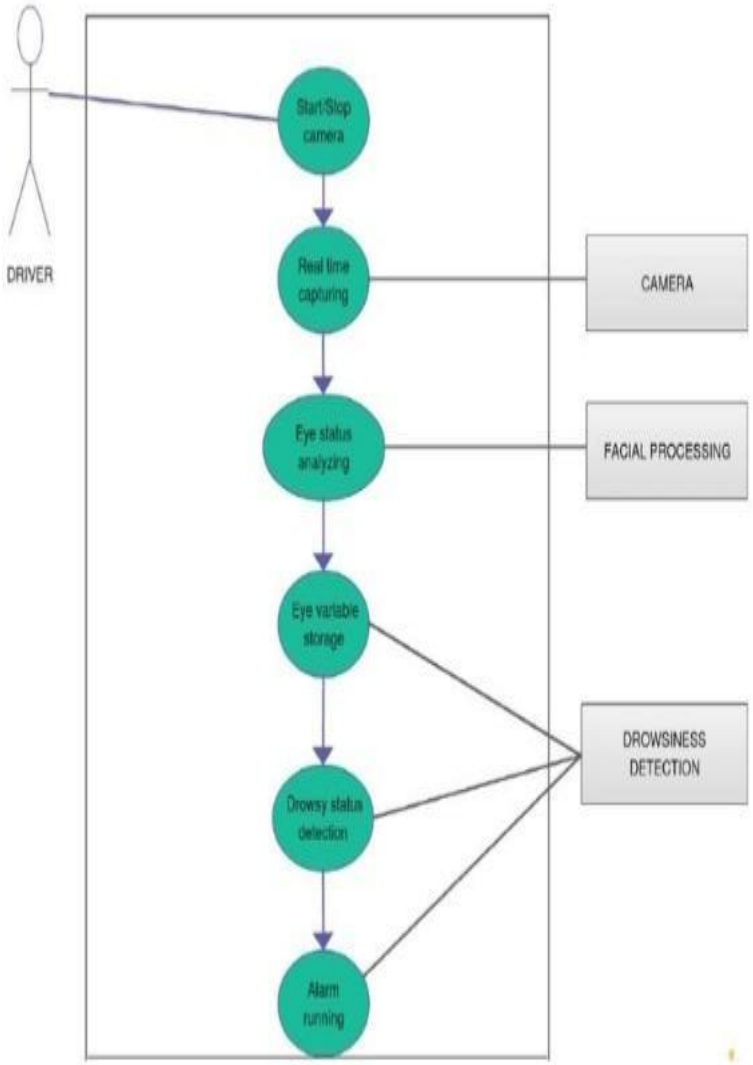

FIG 4.2: Detecting and analyzing drowsiness

FIG 4.3: Web Cam

4.7.1 Logitech C310web camera

Utilized as an instrument to catch pictures of the driver face prior to narrowing it down to the eye area and mouth.

4.7.2. Raspberry pi

•Raspberry pi is a progression of little single-board PCs.

•Several ages of raspberry pi have been delivered. All models include a Broadcom framework on a chip (SoC)with a coordinated ARM-viable focal preparing unit(CPU) and on-chip designs handling unit(GPU).

The Raspberry pi equipment has developed through a few forms that highlight varieties in the kind of the focal handling unit, measure of memory limit, organizing backing, and fringe gadget support.

FIG 4.4: Raspberry Pi

4.7.3. Python software

•Python is an interpreter, verifiable level and comprehensively helpful programming language.

•Python is logically made and rubbish assembled.

•It maintains various programming ideal models including structure, object organized, and utilitarian programming.

•It is a customer described language

•Also Python as an overall programming language, grants you to focus in on focus convenience of the application by managing typical programming tasks.

•Python is an extraordinary extensively helpful programming language. It is used in web progression, data science, making programming models, and so forth

•It is moreover used for math and structure scripting.

4.7.4 WHAT CAN PYTHON DO

•Python can be used on a laborer to make web applications.

•Python can be used close by programming to make work measures.

•Python can associate with data set frameworks. It can likewise peruse and alter records.

•Python can be utilized to deal with large information and perform complex math.

•Python can be utilized for fast prototyping, or for creation prepared programming advancement.

4.8 PYTHON SYNTAX COMPARED TO OTHER PROGRAMMING LANGUAGES

•Python was designed for readability, and has some similarities to the English language with influence from mathematics.

•Python uses new lines to complete a command, as opposed to other programming languages which often use semicolons or parentheses.

•Python relies on indentation, using whitespace, to define scope; such as the scope of loops, functions and classes. Other programming languages often use curly-brackets for this purpose.

4.9 PYTHON APPLICATIONS

4.9.1 Web Development

•Python can be used to make web-applications at a fast rate. It is an immediate aftereffect of the construction Python uses to make these applications. There is ordinary backend reasoning that goes into making these frameworks and different libraries that can help arrange shows like HTTPS, FTP, SSL, etc and even help with the getting ready of JSON, XML, E-Mail subsequently fundamentally more.

•Python relies upon space, using whitespace, to describe scope; like the degree of circles, limits and classes. Other programming tongues consistently use wavy areas hence.

4.9.2 Game Development

•Python is additionally utilized in the advancement of intuitive games. There are libraries, for example, PySoy which is a 3D game motor supporting Python3, PyGame which gives usefulness and a library to game turn of events.

4.9.3 Machine Learning and Artificial Intelligence

•Machine Learning and Artificial Intelligence are the phenomenons as they yield the most encouraging professions for what's to come. We cause the PC to learn

dependent on past encounters through the information put away or even better, make calculations which causes the PC to learn without anyone else.

4.9.4 Data Science and Data Visualization

•Data is money if you know how to extract relevant information which can help you take calculated risks and increase profits. You study the data you have, perform operations and extract the information required.

4.9.5 Desktop GUI

•We use Python to program work area applications. It gives the Tkinter library that can be utilized to create UIs. There are some other helpful toolboxs like the wxWidgets, Kivy, PYQT that can be utilized to make applications on a few stages.

4.9.6 Web Scraping Applications

•Python is a savior when it comes to pulling a large amount of data from websites which can be helpful in various real-world processes such as price comparison, job listings, research and development and much more.

4.9.7 Business Applications

•Business Applications are not the same as our ordinary applications covering spaces, for example, online business, ERP and some more. They require applications which are adaptable, extensible and effectively lucid and Python furnishes us with every one of these highlights. Stages, for example, Tryron are accessible to grow such business applications.

4.9.8 Audio and Video Applications

•We use Python to create applications that can perform multiple tasks and furthermore yield media. Video and sound applications, for example, Tim Player,

Cplay have been created utilizing Python libraries. They give better steadiness and execution in contrast with other media players.

4.9.9 CAD Applications

•Computer-Aided Designing is very difficult to make as numerous things must be dealt with. Articles and their portrayal, capacities are only a glimpse of something larger. With regards to something like this python simplifies this as well and the most notable application for CAD is Fandango

4.9.10 Embedded Applications

•Python depends on C which implies that it very well may be utilized to make Embedded C programming for inserted applications. This assists us with performing more significant level applications on more modest gadgets which can register Python.

4.10 HARDWARE COMPONENTS

4.10.1 Buzzer

A bell or beeper is a sound flagging gadget, which might be mechanical, electromagnetically, or piezoelectric(piezo for short). Normal employments of signals and beepers incorporate caution gadgets, clocks, and affirmation of client information, for example, a mouse snap or keystroke.

4.10.2 Electromechanical Buzzer

•Earlier, the devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word “buzzer” comes from the rasping noise that electromechanical buzzers made.

4.10.3 Piezoelectric

•A piezoelectric component might be driven by a wavering electronic circuit or other sound sign source, driven with a piezoelectric sound enhancer. Sounds ordinarily used to show that a catch has been squeezed are a tick, a ring or a signal.

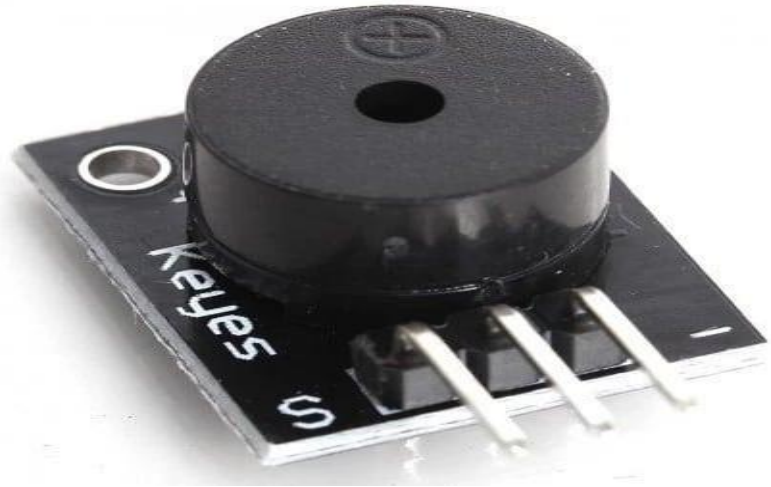

FIG 4.5: Piezo Electric Buzzer

4.11 PIEZOELECTRIC BUZZER

•A piezoelectric buzzer/beeper also depends on acoustic cavity resonance or Helmholtz resonance to produce an audible beep.

4.12 MECHANICAL

•A joy buzzer is an example of a purely mechanical buzzer and they require drivers. Other examples of them are doorbells.

4.13 WEBCAM

•A webcam is a camcorder that feeds or transfers a picture or video continuously to or through a PC to a PC organization, like the Internet.

•Webcams are commonly little cameras that sit on a work area, connect to a client's screen, or are incorporated into the equipment.

•Webcams can be utilized during a video talk meeting including at least two individuals , with discussions that incorporate live sound and video.

•Webcam programming empowers clients to record a video or transfer the video on the Internet.

•As video real time over the Internet requires a lot of transmission capacity such streams ordinarily utilize compacted designs.

•The greatest goal of a webcam is likewise lower than most handheld camcorders, as higher goals would be diminished during transmission.

The lower goal empowers webcams to be moderately reasonable contrasted with most camcorders, however the impact is sufficient for video visit meetings.

4.14 CHARACTERISTICS

•Webcams are known for their low assembling cost and their high adaptability, making them the most reduced expense type of video communication. As webcams developed all the while with show innovations, USB interface speeds and broadband web speeds, the goal went up step by step from 320*240 to 640*480, and some presently significantly offer 1280*720 or 1920*1080 goal.
•Despite the ease, the goal offered starting at 2019 is amazing, with now the low-end webcams offering goals of 720p, mid reach webcams offering 1080p goal, and top of the line webcams offering 4K goal at 60 fps.

•Webcams have become a wellspring of safety and security issues, as some implicit webcams can be distantly initiated by spyware. To address this worry, numerous webcams accompany an actual focal point cover.

4.15 USES

•The most famous utilization of webcams is the foundation of video joins, allowing PCs to go about as videophones or videoconference stations.

•Other mainstream utilizes incorporate security observation, PC vision, video broadcasting, and for recording social recordings.

•The video transfers given by webcams can be utilized for various purposes, each utilizing proper programming.

4.16 VIDEO MONITORING

•Webcams might be introduced at spots, for example, childcare focuses, workplaces, shops and private regions to screen security and general movement.

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•Despite the ease, the goal offered starting at 2019 is noteworthy, with now the low-end webcams offering goals of 720p, mid reach webcams offering 1080p goal, and very good quality webcams offering 4K goal at 60 fps.

•Webcams have become a wellspring of safety and security issues, as some inherent webcams can be distantly enacted by spyware. To address this worry, numerous webcams accompany an actual focal point cover

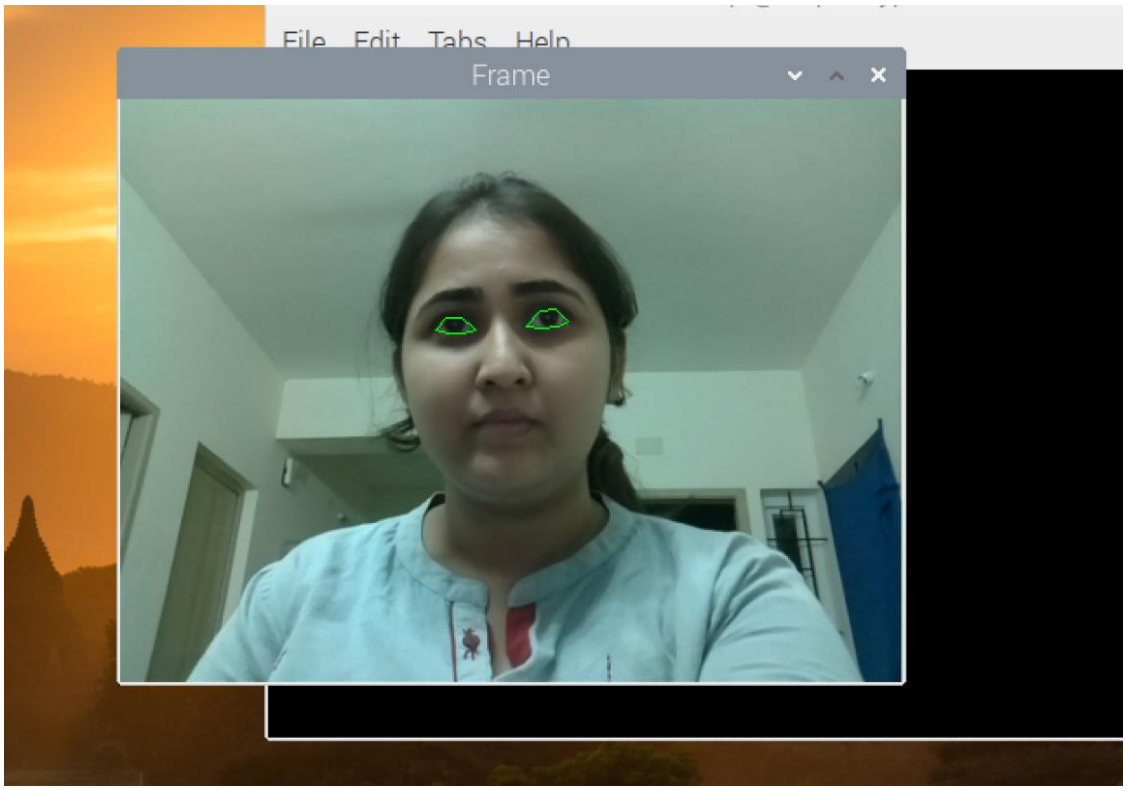

FIG 4.6: Eye Detection

4.17 COMMERCE

•Webcams have been utilized for expanded reality encounters on the web. One such capacity has the webcam go about as a "sorcery reflect" to permit an online customer to see things all alone. The Webcam Social Shopper is one illustration of programming that uses the webcam as such.

4.18 VIDEO CLIPS AND STILLS

Webcams can be utilized to take video clasps and still pictures. Different programming apparatuses in wide use can be utilized for this, for example, Pic Master, and Microsoft's Camera application, Photo Booth, or Cheese.

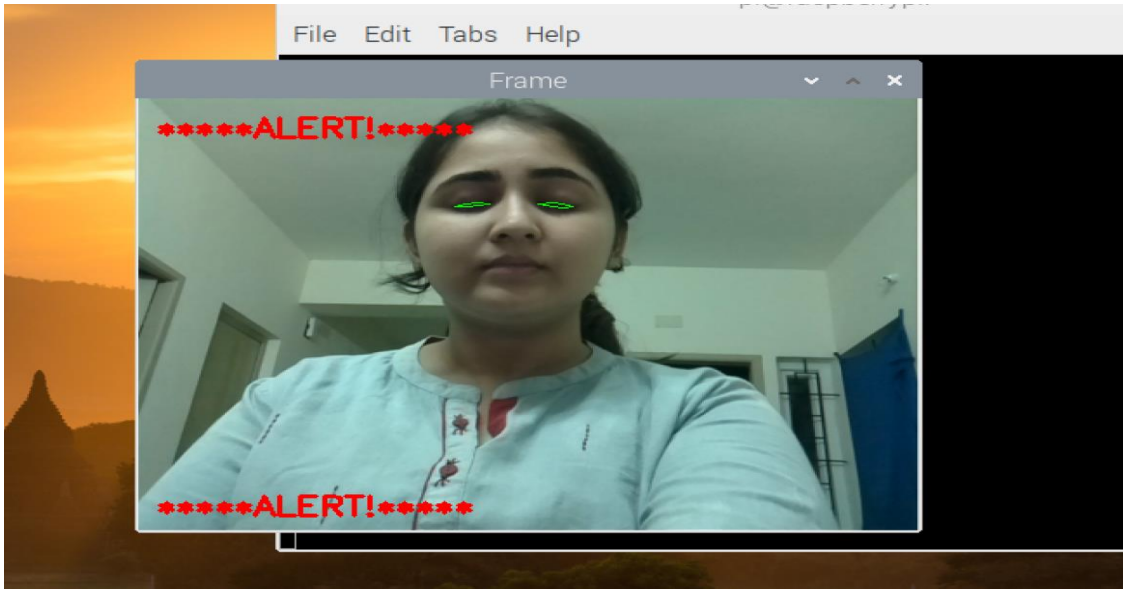

FIG 4.7: When the eyes are closed alert is produced

4.19 VIDEO CALLING AND VIDEOCONFERENCING

•Webcams can be added to texting, text talk administrations, for example, AOL Instant Messenger, and VoIP administrations like Skype, balanced live video correspondence over the Internet has now arrived at a huge number of standard PC clients around the world.

•Improved video quality has assisted webcams with infringing conventional video conferencing frameworks. New highlights, for example, programmed lighting controls, constant improvements, programmed face following and self-adjust, help clients by giving generous usability, further expanding the prevalence of webcams.

•Webcam highlights and execution can change by program, PC working framework, and furthermore by the PC's processor capacities.

•Video calling support has likewise been added to a few famous texting programs.

4.20 VIDEO SECURITY

•Webcams can be utilized as surveillance cameras.

•Software is accessible to permit PC-associated cameras to look for development and sound, recording both when they are identified. These chronicles would then be able to be saved to the PC, messaged, or transferred to the Internet. In one very much plugged case, a PC messaged pictures of the criminal during the robbery of the PC, empowering the proprietor to give police a reasonable image of the thief's face even after the PC had been taken.

4.21 INPUT CONTROL DEVICES

•Special software can use the video stream from a webcam to assist or enhance a user's control of applications and games. Video features, including faces, shapes, models and colours can be observed and tracked to produce a corresponding form of control. For example, the position of a single light source can be tracked and used to emulate a mouse pointer, a head-mounted light would enable hands-free computing and would greatly improve computer accessibility. This can be applied to games, providing additional control, improved interactivity and immersiveness.

4.22 ASTROPHOTOGRAPHY

•With extremely low-light ability, a couple of explicit models of webcams are famous to photo the night sky by stargazers and astro picture takers.
•Mostly, these are manual-center cameras and contain an old CCD cluster rather than a similarly more up to date CMOS exhibit. The focal points of the cameras are taken out and afterward these are appended to telescopes to record pictures, video, still, or both.
•In fresher strategies, recordings of extremely faint articles are required a few seconds and afterward every one of the casings of the video are "stacked" together to get an actually picture of decent difference.

4.23 LASER BEAM PROFILING

•A webcam's CCD reaction is direct corresponding to the approaching light. Subsequently, webcams are appropriate to record laser bar profiles, after the focal point is taken out.

•The goal of a laser shaft profiler relies upon the pixel size.

•Commercial webcams are typically intended to record shading pictures.

•However, a shading pixel comprises of four highly contrasting pixels each outfitted with a shading channel.

•Although these shading channels function admirably in the obvious, they might be somewhat straightforward in the close to infrared.

•By exchanging a webcam into the Bayer-mode it is feasible to get to the data of the single pixels and a goal underneath 3*10^-6m.

4.24 INTRODUCTION TO IMAGE PROCESSING

•Image handling is a technique to play out certain procedure on a picture, to get an improved picture or to separate some helpful data from it.

•It is a sort of sign preparing in which information is a picture and yield might be picture or attributes/highlights related with that picture.

•Nowadays, picture handling is among quickly developing advances. It frames a center exploration territory inside designing and software engineering disciplines as well.

•Image preparing essentially incorporates the accompanying three stages:

1. Bringing in the picture by means of picture procurement instruments.

2. Investigating and controlling the picture.

3. Yield in which result can be changed picture or report that depends on picture examination.

•There are two kinds of strategies utilized for picture handling to be specific, simple and advanced picture preparing.

•Analogue picture preparing can be utilized for the printed copies like printouts and photos.

•Image examiners utilize different essentials of understanding while at the same time utilizing these visual strategies.

•Digital picture handling procedures help in control of the computerized pictures by utilizing PCs.

•The three general stages that a wide range of information need to go through while utilizing advanced

Strategies are pre-handling, improvement and show, data extraction.

4.25 PYTHON

4.25.1 Introduction to Matplotlib

• Matplotlib is an astonishing representation library in Python for 2D plots of clusters.
• Matplotlib is a multi-stage information representation library based on NumPy clusters and intended to work with the more extensive SciPy stack.
• It was presented by John Hunter in the year 2002.
• One of the best advantages of perception is that it permits us visual admittance to immense measures of information in effectively edible visuals.
• Matplotlib comprises of a few plots like line, bar, disperse, histogram, and so on,

4.25.2 Installation

•Windows, Linux and macOS distributions have matplotlib and most of its dependencies as wheel packages.
• Run the following command to install matplotlib package: python -mpip install -U matplotlib.

4.25.3 Lithium Polymer Battery

•A lithium polymer battery, or all the more accurately lithium-particle polymer battery, is a battery-powered battery of lithium-particle innovation utilizing a polymer electrolyte rather than a fluid electrolyte.
•High conductivity semi strong polymers structure this electrolyte.
•These batteries give higher explicit energy than other lithium battery types and are utilized in applications where weight is a basic component, like cell phones, radio-controlled airplane and some electric vehicles.

4.25.4 Design origin and terminology

•Lithium polymer cells have evolved from lithium-ion and lithium-metal batteries.
•The primary difference is that instead of using a liquid lithium-salt electrolyte held in an organic solvent, the battery uses a solid polymer electrolyte such as polyethylene oxide(PEO).
•The solid electrolyte can typically be classified as one of three types: dry SPE, gelled SPE and porous SPE.
•The dry SPE was the first used in prototype batteries, around 1978 by Michel Arman, and 1985 by ANVAR and Elf Aquitaine of France, and Hydro Quebec of Canada.
•From 1990, several organizations like Mead and Valence in the United States and GS Yuasa in Japan developed batteries using gelled SPEs.
•In 1996, Bell core in the United States announced a rechargeable lithium polymer cell using porous SPE.
•A typical cell has four main components: positive electrode, negative electrode, separator and electrolyte.
•The separator itself may be a polymer, such as a micro porous film of polyethylene (PE) or polypropylene (PP); thus, even when the cell has a liquid electrolyte, it will still contain a “polymer” component.

4.26 WORKING PRINCIPLE

•Just similarly as with other lithium-particle cells, LiPos work on the rule of intercalation and deintercalation of lithium particles from a positive anode material

and a negative terminal material, with the fluid electrolyte giving a conductive medium.

•To keep the cathodes from contacting each other straightforwardly, a miniature permeable separator is in the middle of which permits just the particles and not the anode particles to relocate from one side to the next.

•Improved video quality has assisted webcams with infringing customary video conferencing frameworks. New highlights, for example, programmed lighting controls, ongoing improvements, programmed face following and self-adjust, help clients by giving significant convenience, further expanding the prominence of webcams.

•Webcam highlights and execution can fluctuate by program, PC working framework, and furthermore by the PC's processor abilities.•Video calling support has also been added to several popular instant messaging programs

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4.27FLOW CHART

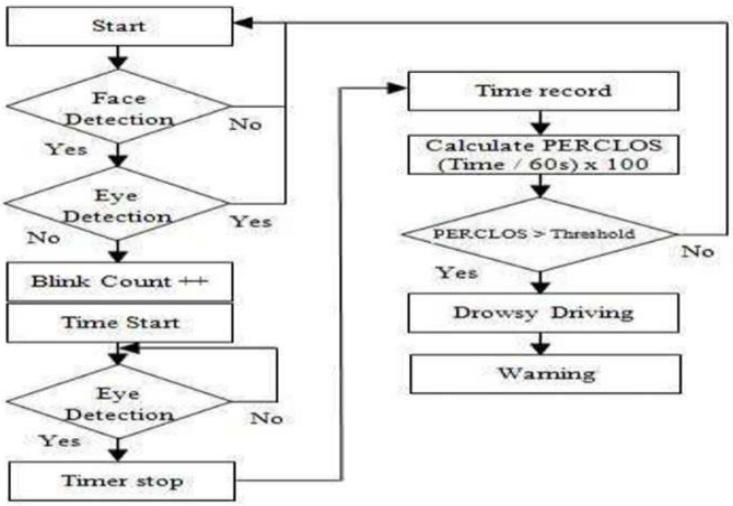

FIG 4.8: Flow chart of complete system

CHAPTER 5

RESULT, DISCUSSION AND PERFORMANCE ANALYSIS

5.1 RESULT AND PERFORMANCE ANALYSIS

Every individual who volunteered for the test will be approached to squint multiple times and act languid multiple times amid the test procedure. The eye squinting exactness was determined by beneath referenced recipe

Eye Detection Accuracy = total number of times detected / (Total number of eyes detected + total number of times eyes not detected)

Drowsiness Detection Accuracy= total no. of times alarm sounds/ (total no. of times alarm sounds + total no. of times alarm didn't sound)

Face or eyes sometimes might not be detected due to lack of ample ambient light. It will in general be seen from the above table that in case model 3 isn't mulled over, at the point the framework has an accuracy of about 100%. That said; the high proportion of disappointments in test 3 exhibits that the framework is slanted to botch and has certain obstacles. In test 3 we didn't utilize ample backdrop lights for the webcam. The subsequent poor lighting conditions gave a very error prone result.

5.2 DISADVANTAGES

5.2.1 Dependency on proper ambient light

With poor lighting conditions once in a while the framework is unfit to perceive the eyes.

So it gives a wrong result which must be managed. Continuously. Circumstances infrared setting enlightenments should be used to repel from poor Lighting conditions.

5.2.2 An optimum range is required

Exactly when the division among face and webcam isn't at perfect range then certain issues develop. Exactly when face is unreasonably close to a webcam (less than 25cm), then the framework is unfit to perceive the face from the image. Right when face is a long way from the webcam (more than 80cm) by then the setting light is missing to edify the face fittingly. So, eyes are not related to high precision which results in both recognizable and proof of sluggishness.
This issue isn't truly considered as progressively circumstances, the partition between driver's face and webcam is perfect so the issue never develops.

5.2.3 Orientation of face

At the point when the face is tilted to a specific degree it will in general be perceived, anyway past this the framework can't identify the face. So when the face isn't recognized, eyes are also not distinguished.

5.2.4 Problem with multiple faces

In case more than one face is recognized by the webcam, at that point the framework gives an incorrect result. This issue isn't huge as we have to recognize the tiredness of a solitary driver.

5.2.5 Poor detection of a person's eye with spectacles

At the point when the driver wears glasses the system may not detect eyes which is the most noteworthy of these systems. This issue has not yet been settled and is a test for practically all eye detection systems structured up and until now.

5.3 RESULT

Table5.1: Result

I/P	Eye detection accuracy	Drowsiness accuracy
Sample 1	100%	87.5%
Sample 2	95%	100%
Sample 3	80%	62.5%
Sample 4	100%	87.5%
Sample 6	100%	100%
Total	95%	87.5%

CHAPTER6

SUMMARY AND CONCLUSIONS

6.1 SUMMARY

To get the result an enormous no. of pictures were taken and their precision in choosing eye gleams and tiredness was attempted.

For this endeavor we used a 5-megapixel webcam related with the PC. The webcam had inbuilt white LEDs associated with it to show it is working. Progressively situation, infrared LEDs should be used as opposed to white LEDs with the objective that the structure is non-intruding. Inbuilt speakers are used to convey sound yield in order to stir the driver when laziness is distinguished.

The system was gone after for different people in different environmental factors lighting conditions (daytime and evening time). Exactly when the webcam scenery light was turned ON and the face is kept at an ideal distance, at a point the system can distinguish squints and laziness with more than 95% precision.

This is a nice result and can be executed by continuous frameworks also. Test yields for different conditions impassively are given underneath. Three pictures were taken; one in which simply the eyes were distinguished and the other in which they were not and another where sluggishness is recognized.

6.2 CONCLUSION

The driver irregularity observing framework created is fit for identifying sluggishness, intoxicated and foolish conduct of drivers in a brief timeframe. The Drowsiness Detection framework created dependent on eye conclusion of the driver can separate ordinary eye squint and laziness and identify the sleepiness while driving. The proposed framework can forestall mishaps because of the drowsiness while driving. The framework functions admirably even in the event of drivers wearing scenes and surprisingly under low light conditions if the camera conveys better yield. Data about the head and eyes position is gotten through different self-created picture handling calculations. During the observing, the framework can choose if the eyes are opened or shut. At the point when the eyes have been shut for a really long

time, an admonition signal is given. Handling passes judgment on the driver's readiness level on the nuts and bolts of constant eye terminations.

Consequently we would have effectively planned and created fractional execution of the driver tiredness recognition utilizing python and Opencv alongside a camera to distinguish the face. The framework to be created is to be tried and constraints are distinguished. The remainder of the work will be finished by what is arranged as of now.

6.3 ADVANTAGES

•Region time following applications.

•Classifications of little particles.

6.4 FUTURE SCOPE

•This structure can be loosened up further to have plentiful security features, for instance, simply a specific number of people can have experts get to or work the vehicle.

•If there ought to be an event of an undertaking to burglary, the vehicle engine doesn't start or an alert sounds. An image of the robber is taken in an endeavored burglary and shipped off the proprietor of the vehicle who can enlist an argument against the cheat of the vehicle.

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