

# **DROWSY DETECTION SOFTWARE FOR CAR/BUS DRIVERS**

Submitted in partial fulfillment of the requirements for the award of degree of

## **BACHELOR OF ENGINEERING IN COMPUTER SCIENCE & ENGINEERING**



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# ABSTRACT

Car accident is that the major explanation for death within which around one.3 million folks die once a year. Majority of those accidents ar caused thanks to distraction or the somnolence of driver. Construction of high-speed main road roads had diminished the margin of error for the driving force. The infinite variety of individuals drives for long distance daily and night on the main road. Lack of sleep or distractions might result in Associate in Nursing accident.

To prevent such accidents, we tend to propose a laptop vision system which will mechanically sight driver somnolence in time period video stream so play Associate in Nursing alarm if the drive seems to be drowsy. Facial landmarks detection or recognition is employed with facilitate of image process of pictures of the face captured mistreatment the camera, for detection of drowsiness. This whole system is deployed on moveable net cam which may be simply put in within the automobile to be used.

**Keywords:** Drowsy Driving; Drowsiness Recognition; Driver.

# Literature Review

In 2008, Hong Suu delineate 'A Partial method of least squares Regression-Based Fusion Model for Predicting the Trend in Drowsiness'. They projected a brand-new technique of modeling driver somnolence with multiple lid movement options supported associate info fusion technique—partial method of least squares regression (PLSR), with that to address the matter of sturdy one-dimensional relations among lid movement options and, thus, predicting the tendency of the somnolence. The prophetic exactness and hardness of the model so established area unit valid, that show that it provides a completely unique means of fusing multi-features along for enhancing our capability of detective work and predicting the state of somnolence.

They projected an answer for driver observation and event detection supported 3-D info from a spread camera is conferred. The system combines 2-D and 3-D techniques to supply head cause estimation and regions-of-interest identification. supported the captured cloud of 3-D points from the sensing element and analyzing the 2-D projection, the points like the top area unit determined and extracted for additional analysis. Later, head cause estimation with 3 degrees of freedom (Euler angles) is calculable supported the repetitious highest points rule. Finally, relevant regions of the face area unit known and used for additional analysis, e.g., event detection and behavior analysis. The ensuing application may be a 3-D driver observation system supported low-priced sensors.

# Comparative Study

Overseas Cases Toyota's Lexus vehicles have applied varied ways to forestall drowsy driving. The Lexus model, launched in 2008, is supplied with Toyota's drowsy driving protection. associate degree infrared camera connected behind the handwheel to acknowledge a driver's somnolence and sound a warning. Lexus vehicles have applied varied ways to forestall drowsy driving.

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[1] Image process technology that acknowledges the driving force with a camera is employed, sculptured in 3D with 238 points and 913 meshes. info concerning the driver's emotions is extracted mistreatment mesh points. [3] The analysis system acknowledges the driver's behavior, like observing another person or observing a smartphone. many factors square measure accustomed increase accuracy for a spread of analytical awareness skills, like age, gender, and race.

[5] The driver's eyes square measure calculated by analyzing the gap between the eyelids and therefore the eyelids. a complete of 4 alarm systems square measure accustomed determine the danger of associate degree accident and supply totally different situational info for every alarm step.

Toyota's Lexus[6] vehicles use a spread of ways and techniques to forestall drowsy driving. However, {they square measure|they're} still within the style part and development has not been completed the driver's eyes are calculated by analyzing the gap between the eyelids and therefore the eyelids. a complete of 4 alarm systems square measure accustomed determine the danger of associate degree accident and supply and supply info for every alarm step. shows the technology developed by Ford to observe and stop drowsy driving. Ford has applied the subsequent techniques to forestall drowsy driving. Ford's system uses associate degree infrared device on the bar but, the accuracy of drowsy driving detection isn't high with these options alone. • cluster analysis is performed mistreatment the vehicle info (acceleration, length, slope). • The driver's driving activity (acceleration pedal and foot lever tilt), surroundings (road and traffic conditions), and therefore the driver's biometric info (temperature, blood heat, respiratory rate, and heart rate) square measure determined to envision their condition.

# Background

Drowsiness may be a serious concern once driving and might cause accidents as a result of it impairs the weather of human performance that ar important to safe driving: slower interval, reduced vigilance, deficits in scientific discipline.

Existing sleepiness detection ways include:

- Carnegie-Mellon analysis Institute:

PERCLOS Systems PERCLOS (percentage closure)[9] is outlined because the activity of the share of your time the pupils of the eyes ar eightieth or a lot of occluded over a given amount. it's been found that PERCLOS may be a reliable live in police work sleepiness.

- Head position metrics:

Systems are devised specified the pinnacle position of the driving force is detected and once the pinnacle leaves the headrest past an exact threshold proportion, the system alerts the driving force.

Project description

The purpose of the sleepiness detection system is to help within the interference of accidents rider and industrial vehicles.[10] The system can find the first symptoms of sleepiness before the driving force has absolutely lost all attentiveness and warn the driving force that they're now not capable of operative the vehicle safely. This device won't, however, guarantee that the driving force are going to be absolutely woke up which associate degree accident are going to be avoided. it's merely a tool for rising driver safety; focusing totally on long-haul truck drivers, nighttime drivers, individuals driving long distances alone or individuals laid low with sleep deprivation.

# Design methodology

The [1] methodology accustomed style the somnolence Detection System is Associate in Nursing repetitious analysis and analysis cycle. The analysis stage generates ideas and also the analysis stage selects ideas, analyse necessities and constraints. The cycle is then perennial to come up with a lot of refined ideas and these ideas square measure additional analysed.

## Requirements

- Reliability: the answer ought to faithfully sight somnolence so it will serve its purpose as a system for promoting driver safety.
- Real-time response: The operation of a vehicle will involve comparatively high speeds, a system {that willnot|that can't} sight somnolence and warn that driver promptly can cause serious consequences.
- Unobtrusive: it's important that the answer is as clear to the driving force as doable.
- Economical: Existing solutions to the present downside square measure on the market nowadays however the effective one square measure sometimes too dearly-won for widespread implementation.
- Flexible: To be effective, thereforelution|the answer} ought to be designed so on accommodate for all kinds of users, in terms of physical attributes.
- Constraints
  - Space: the answer must be enforced during a space-efficient manner. It should not interfere with the present controls of the automobile.
  - Power: there'll be a restricted power supply that the answer must designed so it will operate properly on restricted power necessities.
- Proposed style
  - Eye detection algorithm:

The [4] physiological properties and appearances of the eyes are going to be investigated and also the technique of capturing these properties of the eyes victimisation infrared lighting are going to be explored. Kalman trackers are going to be accustomed verify eyes and head dynamics between ordered pictures and a probabilistic model are going to be accustomed calculate the driver's vigilance.

- Lane chase detection algorithm:
- Using image process techniques measures the behaviour of a driven vehicle with relation to the vehicle's position to the environment.



# Required tools/technology

The requirement of tools is quite straightforward. we just need a laptop installed with latest version of OpenCV, python, and a webcam which we can use from laptop.

- **OpenCV**
- **DLib**
- **Python**
- **Raspberry Pi**
- **Webcam**

Facial recognition should be first performed in order to detect eye blinking. Therefore, system which we are going to make uses a webcam to recognize facial expression through webcam, a portable webcam would be very good for this good so that we can

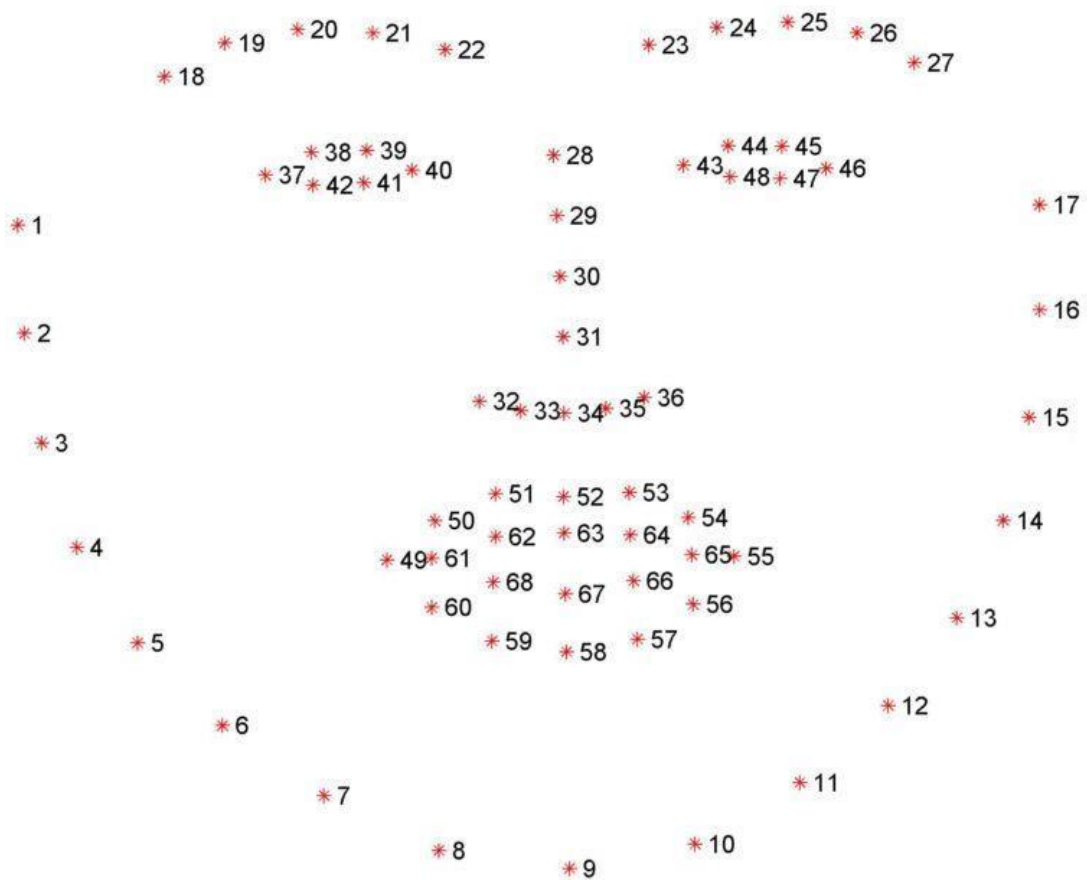
Stick it to the dash board of the car or we can use micro camera hidden in stuff toys and put it to the dash board facing it to the driver.

The system is going to be based on purely program coding in laptop, so it is necessary to have a laptop with latest version of OpenCV, python, raspberry pi. Not most needed but it is good to have a fast-processing laptop so that it does crash while running such huge program me

# Facial landmark indexes for face regions

The facial landmark detector implemented inside dib produces 68 (x, y)-coordinates that map to specific facial structures. These 68-point mappings were obtained by training a shape predictor on the labelled.

Below we can visualize what each of these 68 coordinates map to



**image, we will see that facial regions is accessed via easy Python classification (assuming zero-indexing with Python since the image on top of is one-indexed):**

- **The mouth is accessed through points [48, 68].**
- **The right brow through points [17, 22].**
- **The left brow through points [22, 27].**
- **The right eye victimizations [36, 42].**
- **The left eye with [42, 48].**
- **The nose victimization [27, 35].**
- **And the jaw via [0, 17].**

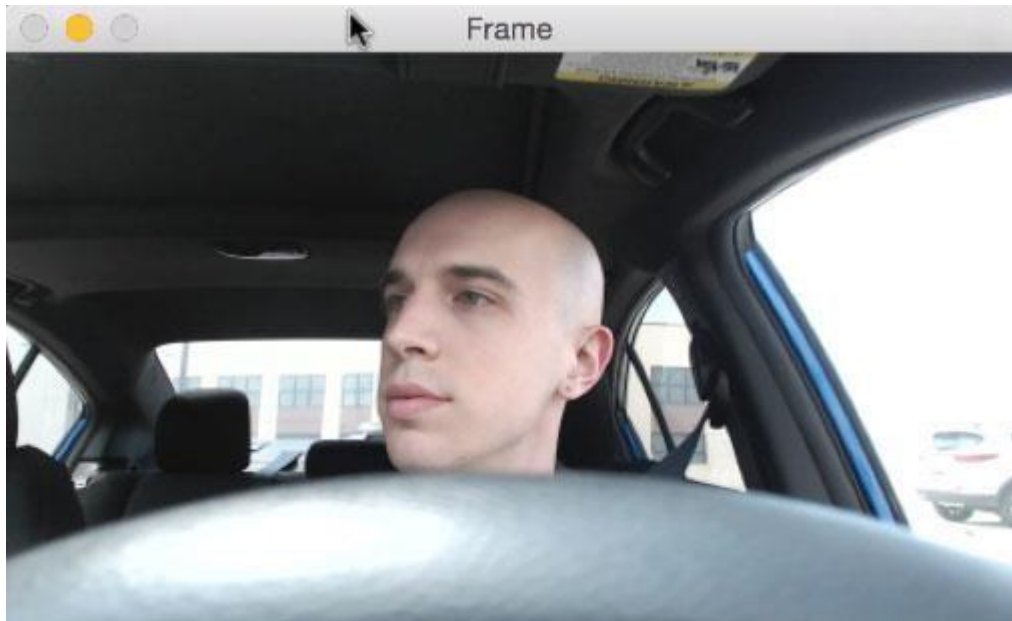
A [7] identity verification system uses biometry to map face expression from a photograph or video. It compares the knowledge with a information of better-known faces to search out a match.

That's however a identity verification system works, however on a grand, algorithmic scale. wherever you see a face, recognition technology sees knowledge. That knowledge is keep and accessed. for example, 1/2 all yank adults have their pictures keep in one or additional facial-recognition databases that enforcement agencies will search, in line with a Georgetown University study.

# Complete work plan layout

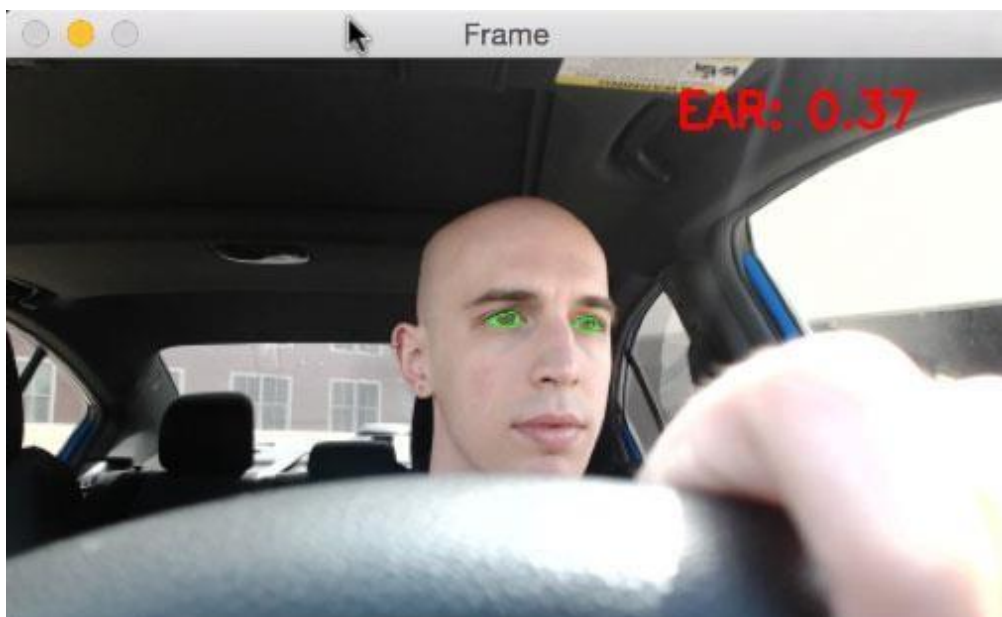
The general flow of our drowsiness detection algorithm is fairly straightforward.

First, we'll setup a camera that monitors a stream for faces:



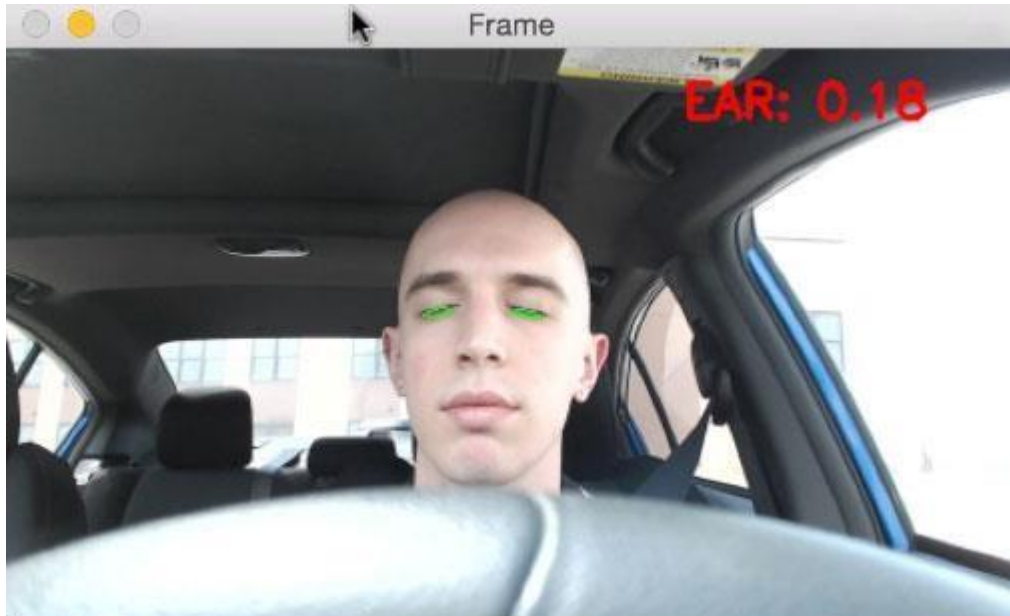
**Figure 1:** Step #1 — Look for faces in the input video stream.

If a face is found, we apply facial landmark detection and extract the eye region



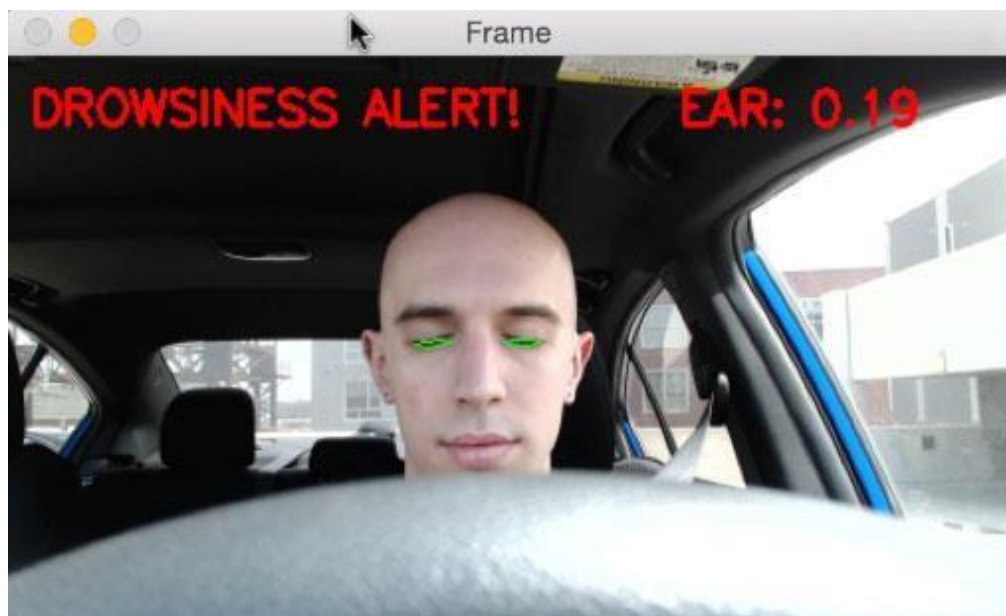
**Figure 2:** Step #2 — Apply facial landmark localization to extract the eye regions from the face.

Now that we have the eye regions, we can compute the eye aspect ratio to determine if the eyes are closed:



**Figure 3:** Step #3 — Compute the eye aspect ratio to determine if the eyes are closed.

If the eye aspect ratio indicates that the eyes have been closed for a sufficiently long enough amount of time, we'll sound an alarm to wake up the driver:

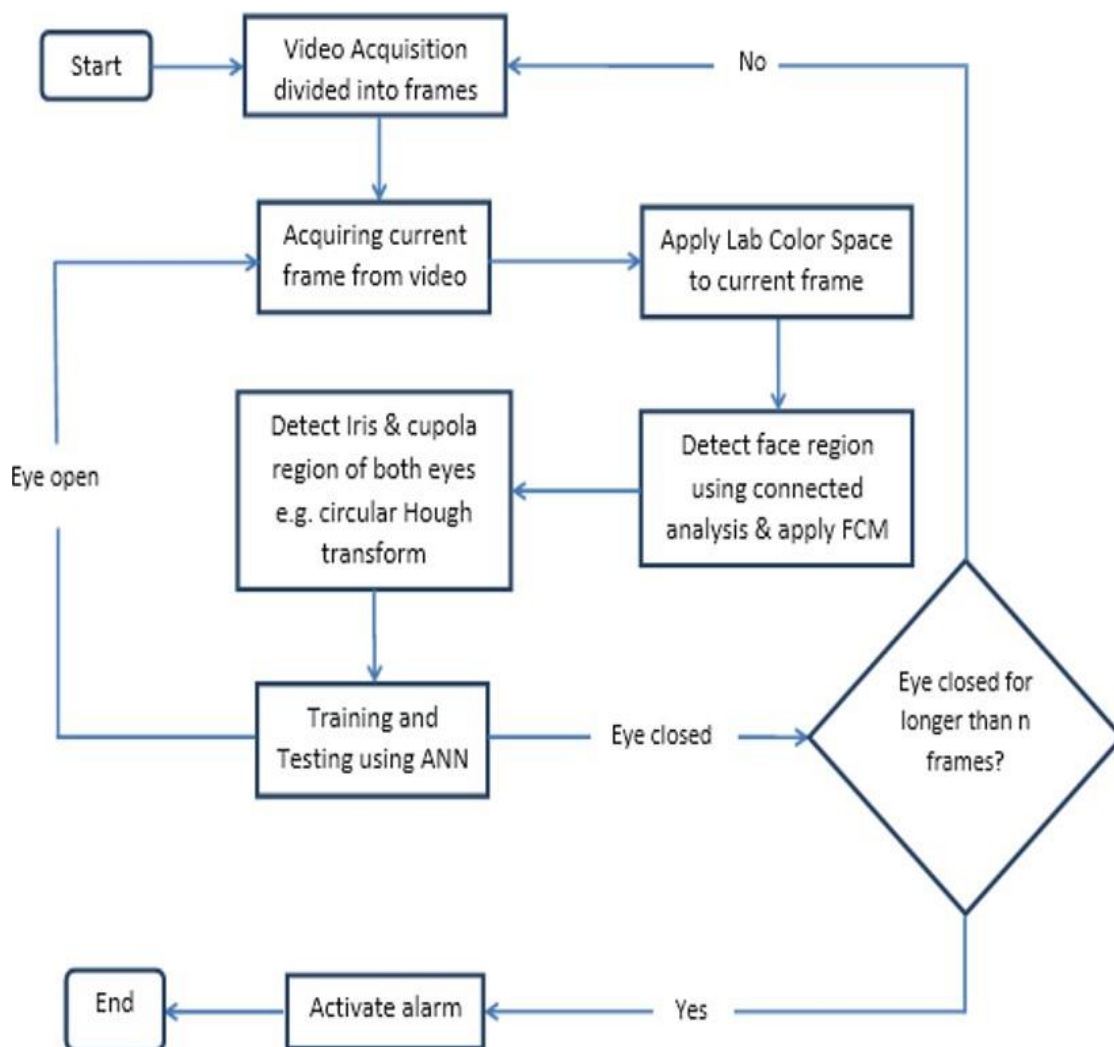


**Figure 4:** Step #4 — Sound an alarm if the eyes have been closed for a sufficiently long enough time.

In the next section, we'll implement the somnolence detection formula elaborate on top of victimization OpenCV, dib, and Python.

[11] We'll want the SciPy package thus we will reason the euclidian distance between facial landmarks points within the eye ratio calculation (not strictly a demand, however you ought to have SciPy put in if you propose on doing any add the pc vision, image process, or machine learning space).

We'll additionally want the imputes package, my series of pc vision and image process functions to create operating with OpenCV easier.



# Market Overview

## Key insight:

The global Driver temporary state Detection System market is extensively researched and analyzed within the report back to guide market players to enhance their business coming up with and guarantee semipermanent success. [12] The authors of the report have used easy language and straightforward to know applied mathematics pictures and provided thorough data and in-depth knowledge on the world Driver temporary state Detection System market. The report provides players with crucial data and suggests result-oriented techniques to achieve a competitive edge up the worldwide Driver temporary state Detection System market. It represents however totally different players area unit competitory within the world Driver temporary state Detection System market and quote the ways they're victimization to differentiate themselves from different participants.

Vital application areas of Driver temporary state Detection System market also are examined on the idea of their performance. Market estimations alongside the applied mathematics nuances enclosed within the report offer associate degree perceptive read of the motive force temporary state Detection System market. The market research on world Driver temporary state Detection System Market 2019 report serves gift likewise as Driver temporary state Detection System market future aspects primarily rely on factors on that the businesses participate within the market growth, crucial trends and segmentation analysis.

**Key Market Driver -**

Rapid adoption of advanced technology, rising safety concerns and rising popularity are expected to drive the growth of the heads up display market in the forecast period.

**Key Market Restraint -**

High cost are expected to hinder the growth of the heads up display market

The scope of Driver sleepiness Detection System Market report:

[13]Global market size, supply/demand, consumption, cost, import/export, political economy analysis, type, end-user, and application phase data by region, including

Asia-Pacific [China, geographical area, Western Asia, India, Japan, Korea]

Europe [Germany, uk, Spain, France, Italy, Russia, European country, Turkey, Switzerland]

North America [US, Canada, Mexico]

Middle East Africa [South Africa, geographic area, GCC]

South America [Brazil, Chile, Argentina, Columbia, Peru]

Industry chain study, material, and end-users knowledge

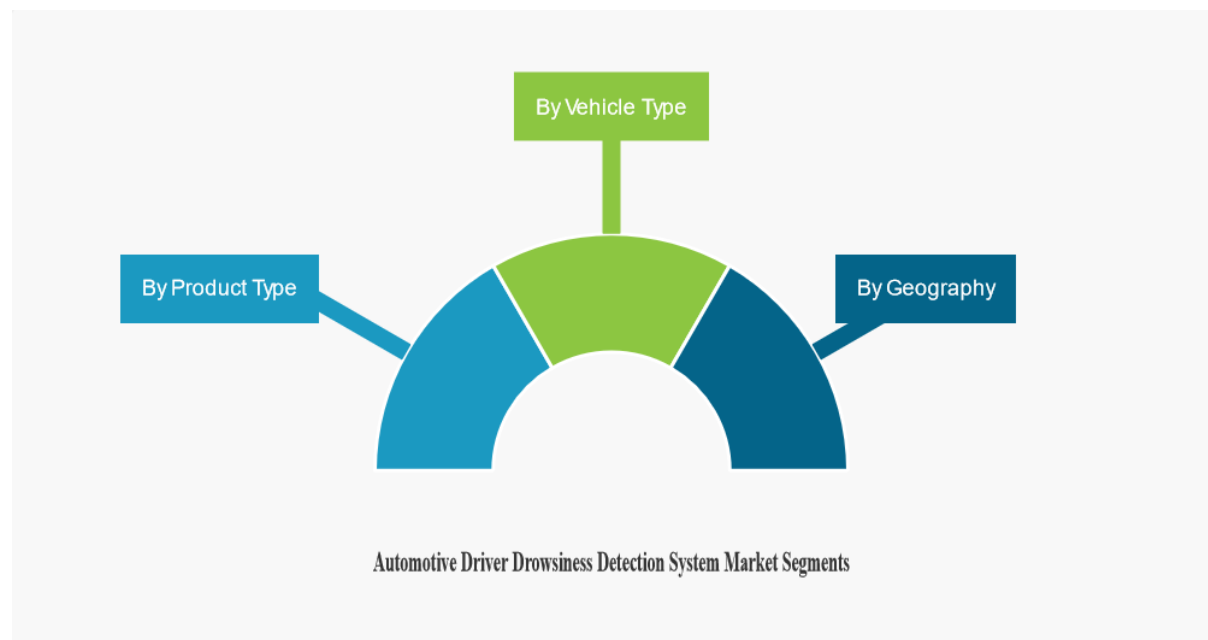
Worldwide key players data together with SWOT analysis, companys money figures.

Strong marketing research tools utilized in the report that's pesterer analysis, Porters 5 forces analysis, drivers and restraints, opportunities and risks.



Based year during this report is 2019; the historical knowledge is from 2013 to 2018 and therefore the forecast year is from 2019 to 2028.

Driver sleepiness Detection System market reports convey insight and professional analysis into necessary shopper trends and behavior within the marketplace. Moreover, Associate in Nursing outlook on market knowledge and key brands. Driver sleepiness Detection System market reports delineated data with simply comprehensible language to guide each Driver sleepiness Detection System businessman future innovation and move the business ahead.



## Segmentation:

ATTRIBUTE	DETAILS
By Product Type	<ul style="list-style-type: none"><li>• Hardware Devices</li><li>• Software System</li></ul>
By Vehicle Type	<ul style="list-style-type: none"><li>• Passenger Cars</li><li>• Commercial Vehicles</li></ul>
By Geography	<ul style="list-style-type: none"><li>• North America (USA, Canada, and Mexico)</li><li>• Europe (Germany, France, U.K., and Rest of Europe)</li><li>• Asia Pacific (Japan, China, India, South Korea, and Rest of Asia Pacific)</li><li>• Rest of the World</li></ul>

## Key Market Segmentation:

Driver temporary state Detection System Market, by Type:

- Hardware Devices
- computer code

Driver temporary state Detection System Market, by Application:

- car
- industrial Vehicle

# Report Scope

## **A complete interpretation of the worldwide Driver sleepiness Detection System market**

Driver [4] sleepiness Detection System market supported varied segments like product sort, application, user etc.

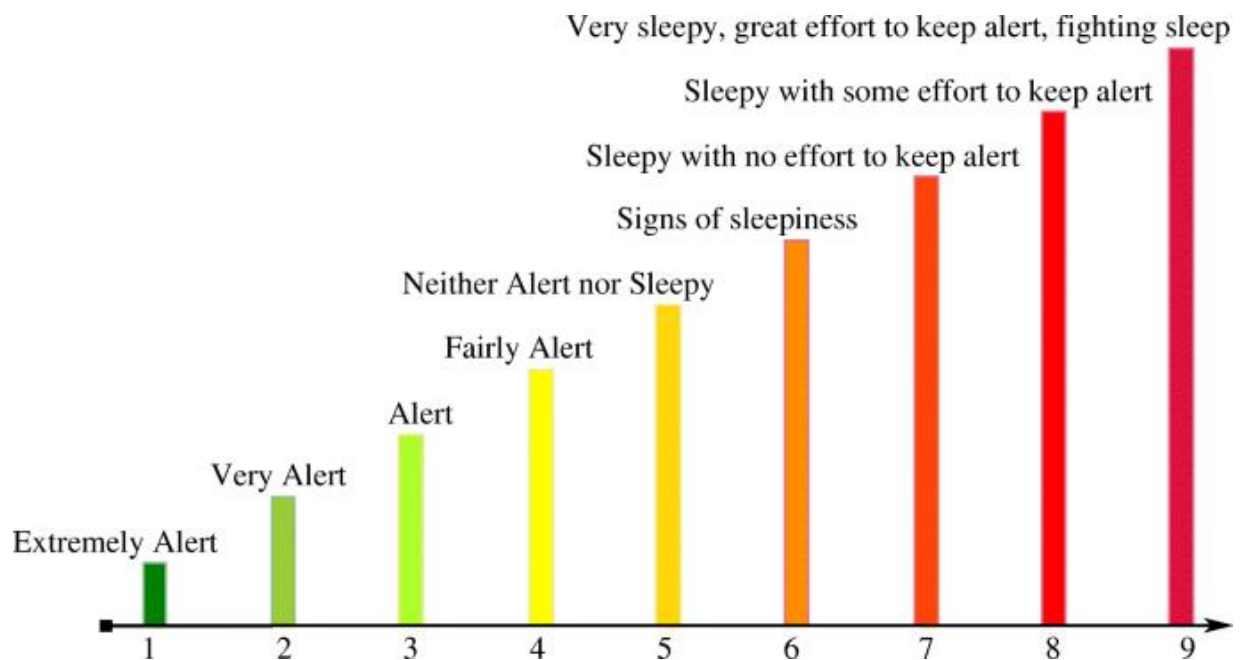
vital success factors and pain points within the type of growth drivers and restraints leading the market outlook in conjunction with future trend examination thorough company profiles providing insights into their product offerings, strategies, revenue info and latest market activities

info on trade worth c associate degree of the worldwide Driver sleepiness Detection System market providing an analytical study of key stakeholders concerned, that might advance market participants in formulating applicable ways

Competitive landscape of the worldwide Driver sleepiness Detection System market and market share analysis supported company's performance and client reach

# The Model Architecture

1. The [8] model we tend to use is made with Kera's exploitation Convolutional Neural Networks (CNN). A convolutional neural network may be a special style of deep neural network that performs very well for image classification functions. A CNN primarily consists of associate degree input layer, associate degree output layer and a hidden layer which may have multiple numbers of layers. A convolution operation is performed on these layers employing a filter that performs second matrix operation on the layer and filter.
- The CNN model design consists of the subsequent layers:
  - Convolutional layer; thirty-two nodes, kernel size three
  - Convolutional layer; thirty-two nodes, kernel size three
  - Convolutional layer; sixty-four nodes, kernel size three
  - Fully connected layer; 128 nodes



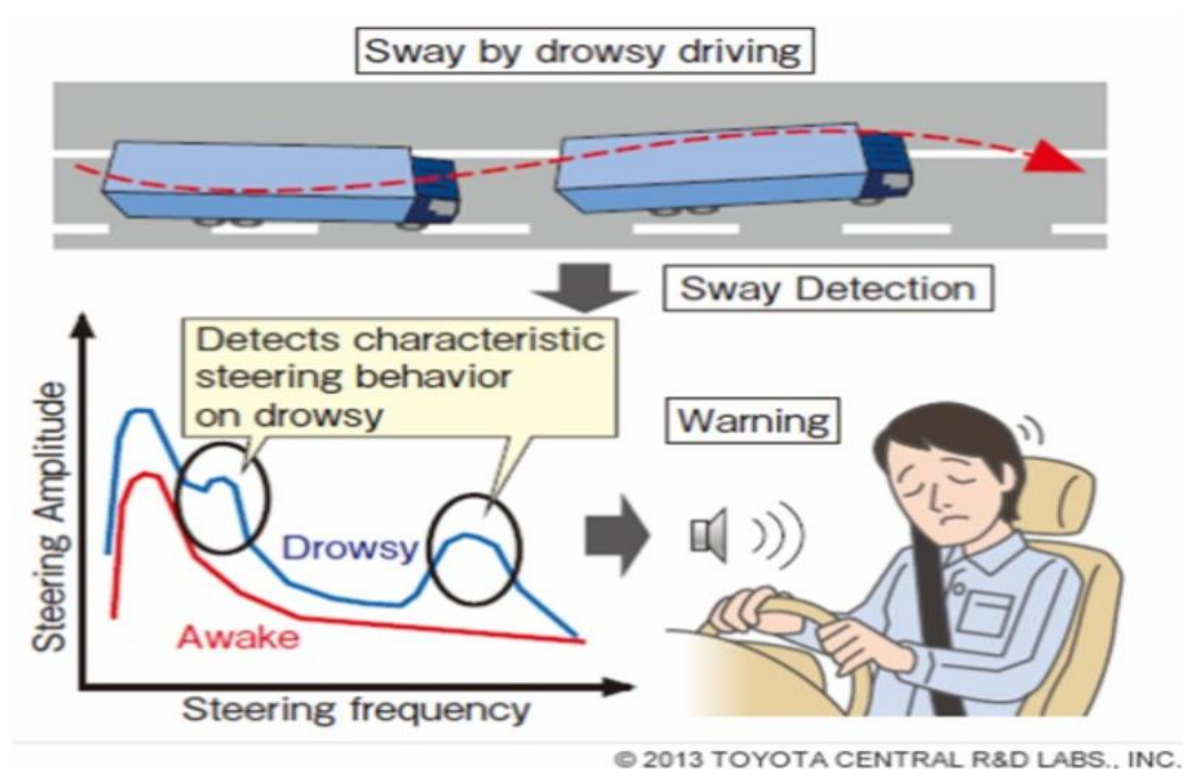
2. Carbon oxide Detection: As a result of a previous survey, it absolutely was found that the prevalence of the many drowsy driving operations depends on the air quality in vehicles. Therefore, this technique tried to stop drowsy driving by police investigation the concentration of CO<sub>2</sub> in [9] vehicles. represents a detector for measurement the concentration of CO<sub>2</sub> of the NDIR (Non-Dispersive Infrared) system. If the concentration of CO<sub>2</sub> was over 1500 ppm, it absolutely was expected that sleepiness would seem. Health problems. The sensor has high durability and high accuracy, thereby detecting drowsy driving quickly.



# Merit of Proposed system

The main aim of our project is to develop non-intrusive system which is able to observe the fatigue or temporary state of driver and can issue a warning with the assistance of alarm. As most of the accidents square measure caused due to temporary state thus this project can facilitate to decrease the crashes or accidents. automotive [10] accident is that the major explanation for death within which around one.3 million folks die per annum.

Majority of those accidents square measure caused due to distraction or the temporary state of driver. Construction of high-speed route roads had diminished the margin of error for the driving force. The incalculable variety of individuals drives for long distance daily and night on the route. Lack of sleep or distractions could cause associate accident.



# CONCLUSION

Previous studies have planned variety of strategies to notice temporary state. when doing literature survey, totally different techniques are found for detective work driver temporary state and that they use differing kinds of information as input for his or her rule. when the survey of various varieties of strategies, it's found that victimization camera is that the best technique which might be simply applied and applicable all told conditions. we tend to attempt to explore this technique of pc vision and planned a noble technique to notice driver temporary state supported detective work palpebra closing and gap victimization artificial neural networks as classification rule. 1st of all, the video frames area unit noninheritable from the camera that may be fastened in such the way that it shouldn't hinder the road- read of the driving force.

The largest region is to be detected victimization Connected Analysis. The face of the driving force are going to be found within the video in such the way that it shouldn't have an effect on the performance of correct face detection in terms of variable lightning conditions. The Morphological Operations area unit applied to the attention region. at the moment feature are going to be fed to the network as input and classified victimization artificial neural networks. The buzzer sound generating perform are going to be build which can alarm the driving force just in case temporary state is detected.

Finally False and true positive rates are going to be calculated to live the preciseness magnitude relation of the rule

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