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Real Time Driver Drowsiness Detection System using OpenCV

Ritish H[1], Manu DK[2], SathvikShetty MK[3], Kiran H P[4], Smitha SP[5]
[1, 2, 3, 4]*Student,* [5]*Assistant Professor, Department of Information Science and Engineering, Sai Vidaya Institute of Technology Bangalore, India*

Abstract— Most knowledge is transmitted by the eyes, an essential part of the body. When an operator is in a state of exhaustion, facial expressions, e.g., blinking and yawning rate, vary from those in normal condition. In this venture, we are proposing a system named Driver-Drowsiness Detection System, which monitors the exhaustion state of the drivers, such as yawning, and eye closing length, using video clips, without equipping their bodies with sensors. We are using face-tracking algorithm to improve tracking reliability due to the limitations of previous algorithms. We have used facial region detection method based on 68 key points. Then we use these areas of the head to determine the condition of the passengers. Through integrating the eyes and mouth, Driver-Drowsiness Detection System can use an exhaustion alarm to alert the driver.
Keywords— Yawning, Face Detection, Eye Detection, Mouth Detection

I. INTRODUCTION

In the recent years, increasing the demand for transport to this point requires a faster growth in car parks. The mode of transport for the people is currently also a necessary one. A total of 97 million automobiles were sold worldwide in 2017, which was 0,3% over 2016. The global estimate of the number of cars used was more than one billion in 2018. Although the machine has changed people's mood and made daily operations more convenient, the machine has a number of negative effects, such as traffic accidents. A National Administration report for Road Traffic Safety showed that in 2016 a total of 7,277,000 traffic accidents led to 37,461 deaths, 3,144,000 injuries. During these accidents, tired driving caused a hundredth of a combination of road accidents. Tired driving could therefore even be a very major and latent danger in road accidents. The fatigue control-detection system has become a topic of best analysis in recent years.

Subjective and objective detection of detection strategies. In intervals, the driver needs to participate in an analysis related to driver's subjective perceptions through the processes of self-questioning, analyse and questionnaire completion at intervals of the subjective detection methodology. Such knowledge then is used to estimating the vehicles driven by fatigued drivers, so that drivers can consequently adjust their schedules. However, driver feedback at intervals is not required for the methodology of target detection because the results monitor the condition and drive properties of the driver in real time. The knowledge collected is worth the fatigue of the driver. Objective detection of what are heaps, is classified in two: Contact and less contact. Contact reduction is cheaper and much more practical as compared with the contact methodology, as the system result is unloved. laptop Sophisticated vision or camera techniques enable additional cars to use the device.

The contactless methodology was widely used for fatigue-driving detection due to simple installation and low value. Attention Technologies and the Wise Eye, for example, use driver's eyes movement and driver's position to determine the extent of fatigue.

II. PROBLEM STATMENT

An Monitoring the drivers action whereas driving by examining the manoeuvred of the vehicle will be a really outstanding task so as to reinforce safety whereas driving. To differentiate between unintentional and intentional automobile handwheel inputs, are going to be the most key part to be discovered, like a fast giant steering input might indicate the driver’s level of alertness. Almost all the statistics have known driver somnolence as a high priority vehicle safety issue. somnolence has been calculable to be concerned in 10-40 per cent of crashes on motorways. Fall-asleep crashes ar terribly serious in terms of injury severity and a lot of doubtless to occur in sleep-deprived people. There is associate degree raised interest with relevance the planning and advancement of pc controlled automotive applications to beat those issues by enhancing safety to scale back accidents, increase traffic flow, and enhance comfort for drivers.

A. Existing System

The existing system measures whether the correlation between eye and control changes indicating distraction. The self-correlation and the horizontal angle and handwheel angle interrelation between the eyes show a certain correlation between the movements of the eyes associated with the scanning process. Careful correlation steering may manage the link on a straight road. The straight diode leads to an occasional correlation of directional movement with eye looks. It seeks to observe the visual

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behaviour or the performance of the driving forces that support the driving force distraction, therefore the link between visual behaviour and thus vehicle management is usually described for this purpose. This method estimates the straight road-related eye-direction correlations with the idea to show a totally different relationship, qualitatively and quantitatively, compared to the curved road which is sensitive to distraction. A key mechanism of perception controlling that plays an important part in driving is reflected in the relationship between visual behaviour and vehicle management and a strong correlation of eye control related to this method is found on curved roads.

B. Proposed System

Only the eye region process detected fatigue and distraction in the planned system. The driver's eyes appear to be most symptoms of fatigue and distraction due to sleep, while driving. Today several fatigue find strategy exists, and the best way of capturing the eyes is to capture the physical responses in the eyes in real time. In addition, the attention region processes rather than the face region process has less quality of the machine.

III. SYSTEM DESIGN

A. Methodology

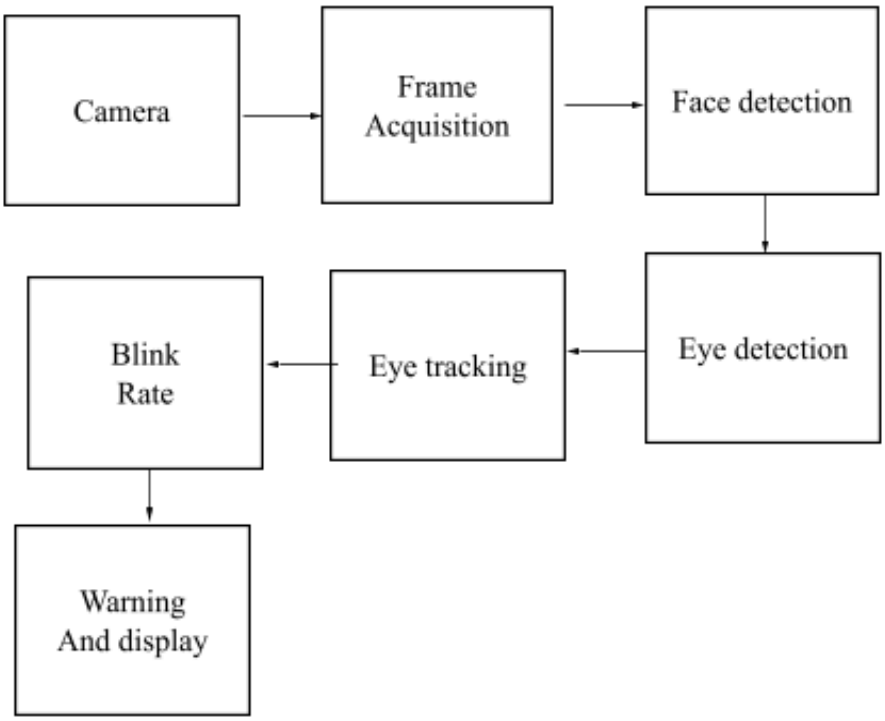

Fig. 1. Methodology

Image Capture Utilizing an online camera exhibited within the vehicle we will get the image of the driving force. still the style during which that the camera makes a video cut, we've got to use the calculation on every fringe of the video stream to urge the sides for the more procedure. Partitioning into Frames it's discovered the way to get the consistent state of affairs wherever video is recorded and may be readied. Be that because it could, the video is not that is employed at the same time therefore it's modified over into image. Hereafter the video should be divided into edges for exploring. Face Recognition during this stage it's recognized that the region containing the quintessence of the driving force. For each packaging a pre-defined count is for the face space. By facial recognition, we tend to conclude that the facial finding zone in a footprint or on the day's finish by a sort of advance with the use of the computer. Every subjective package is also the packaging. Structures or options connected only to the face Recognized sq measurements, and unheeded styles of every other article such as structures, tree and bodies.Eye Detection when acknowledgment of face eye need to be distinguished for more taking care of. The call parameter for locating a driver state is within the methodology eye.

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IV. FLOW CHART

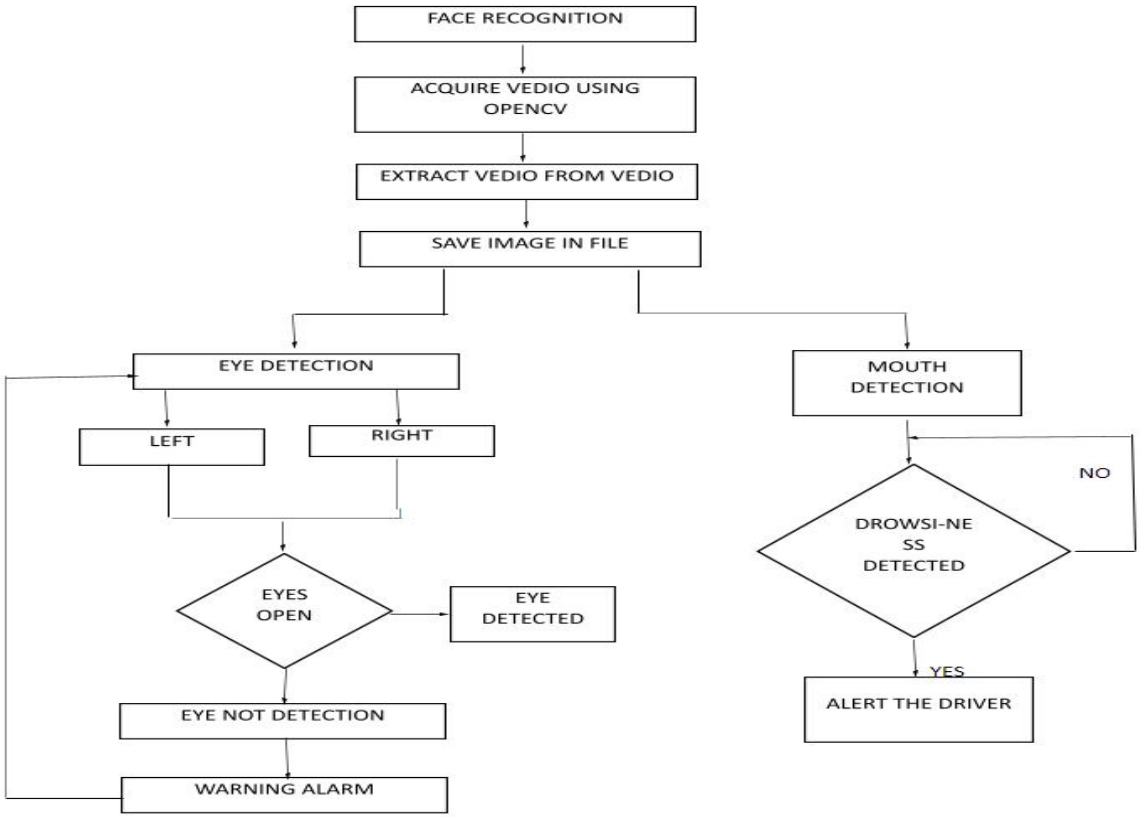

Fig. 2. Flow Chart

V. USE CASE DIAGRAM

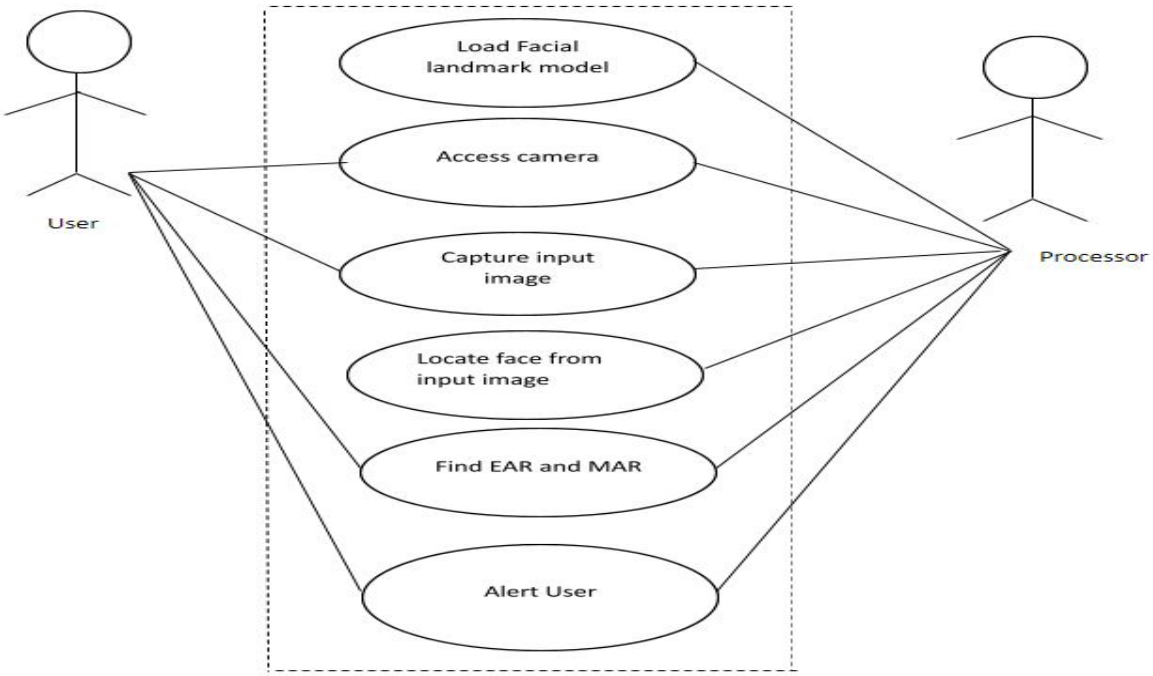

Fig. 3. Use Case Diagram

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A. OpenCV

OpenCV is a vision library for open source computers. The C and C++ library runs under Unix's, Windows and OS X operating systems. The development of Python, Ruby, Matlab interfaces and alternative languages is active. OpenCV has been designed for process efficiency and has a robust time specialisation. OpenCV has an optimised C and can use multiple core processors to the best advantage. If you are interested in additional automatic enhancement in Intel [Intel] architectures, you can also get Intel Integrated Performance Primitives [IPP] libraries, which are low level optimised in a number of different recurrency areas. OpenCV uses the appropriate IPP library during the runtime when this library is installed. One of the aims of OpenCV is to create a simple PC vision infrastructure, so that people can develop fairly advanced vision applications quickly. The library consists of 500 viewing functions, industrial plant product review, medical imagery, safety, interface, standardised cameras, stereo and AI. There are 500 different functions in this library. As a result of pc view and machine learning, OpenCV includes a complete, general Machine Learning Library (MLL). This sub-library is aimed at identifying and bunching applied mathematical patterns. The MLL can be very useful in viewing tasks which are measured squarely at the heart of OpenCV, but is sufficiently usual for any problem in machine learning.

VI. IMPLEMENTATION

A. Image Acquisition

As a result of the image acquisition, there is no possible process while not a picture is always the first step in the workflow sequence. The picture which is unprocessed is that the results of no matter what hardware are used to generate it, which may be so vital to have a coherent basis from which to work. Image acquisition is carried out during this system time period. This involves taking photos from an item that captures pictures automatically. The image acquisition time period created a stream of files that are usually processed mechanically, queued later. The pictures nonheritable square measure hold on in step with their time-stamps. Once the series of frames of pictures square measure obtained any process on the image is performed to find the face expression.

B. Face Detection

Various face detection techniques are used to determine the locations and features of human faces in digital pictures. the main aim of face findion is to detect a facial region no matter the position, orientation and illumination of the image.These techniques mainly find the facial and non-facial regions of the image. completely different techniques used for face detection are namely Knowledge-based strategies, Feature invariant approaches, Appearance-based strategies, and guide matching strategies. Here in this system guide matching technique is used to extract facial regionsred pixels and reject all the background unwanted pixels however still bound noisy pixels are gift. To take away the noise from the image morphological operations area unit performed. The aim is to induce an image with skin region without any noise affecting the results. Once this is often done, system identifies whether or not the individual whose face was detected is an authorized person. Here the noninheritable image is compared with each alternative recognized individual within the information. If a match is found the system is ready to acknowledge the individual otherwise it's an unauthorized driver.

C. Eye Detection

The next step in the system is to detect the location of eyes. Locating the eyes and tracking its movement i.e. opening and closure of eyes helps us to confirm that the person is drowsy or not. To detect the eyes eye map based on chrominance component is built.The eye map highlights the eyes regions. we will then convert the eye map image to a black and white image using correct threshold. This new image is meant to incorporate the eyes in white whereas the remainder is all black. However, many pre-processing steps together with erosion and dilation ar needed to spot the eyes within the image.

D. Mouth Detection

The next step in detecting the yawn is to trace the mouth movement i.e. is gap and shutting of mouth whereas yawning. just like the eye map, mouth map is additionally based on the chrominance parts. Muth colour includes a red element stronger and a blue element weaker than alternative facial regions. The chrominance element cr is therefore larger inside the mouth than Cb.The mouth map can then bear some post process steps like black and white conversion, erosion, dilation and finding the largest connected elements within the same manner as the eye detection theme. The geometrical options of the face and relative location of the mouth with relevancy eyes will be exploited during this step to verify the validity of the detected mouth.

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E. Yawning Detection

One of the factors to consider when a person is drowsy is yawning. A yawning is an unwilling intake of a wide open mouth, usually yawning, which can ensure the individual is not fit to drive. Detection of whether an individual is drowsy or not can be done in 2 steps:

- Yawn component in face is independent of mouth location is detected by identifying the hole in the mouth as a result of wide opening of mouth.
- The location of the mouth is used to detect the correctness of the detected yawn Component
- closing of eyes for a longer duration

VII. TEST CASES AND RESULTS

A. Capture Video Test Case

Test Case	1
Name of Test	Video capture
Input	Web camera index
Expected output	Video feed from select camera
Actual output	Video output displayed from selected camera input
Result	Successful

B. Find Face Landmarks Test Case

Test Case	1
Name of Test	Facial landmarks
Input	Input image to be processed and facial landmarks dataset
Expected output	Display facial features and plotting on to the input image
Actual output	Image with all the face features plotted and highlighted
Result	Successful

C. Extracting Eye Features Test Case

Test Case	1
Name of Test	**Extracting eye features**
Input	Input image and face landmarks
Expected output	Left and right eye extracted
Actual output	Both the eye were extracted successfully from input image
Result	Successful

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D. Extracting Mouth Features Test Case

Test Case	1
Name of Test	**Extracting Mouth features**
Input	Input image and face landmarks
Expected output	Mouth points extracted
Actual output	Mouth points extracted successfully from input image
Result	Successful

E. Output Display Test Case

Test Case	1
Name of Test	**Output display**
Input	MAR ,EAR
Expected output	Plotted facial features on user input face
Actual output	Facial features plotted on user face input
Result	Successful

F. Audio Alert Test Case

Test Case	1
Name of Test	**Audio alert**
Input	EAR and MAR values
Expected output	Audio output when values exceed threshold
Actual output	Audio output heard on values exceeded
Result	Successful

Fig. 4. Yawning

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Fig. 5. Eye Detection

Fig. 6. Mouth Detection

VIII. CONCLUSIONS

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

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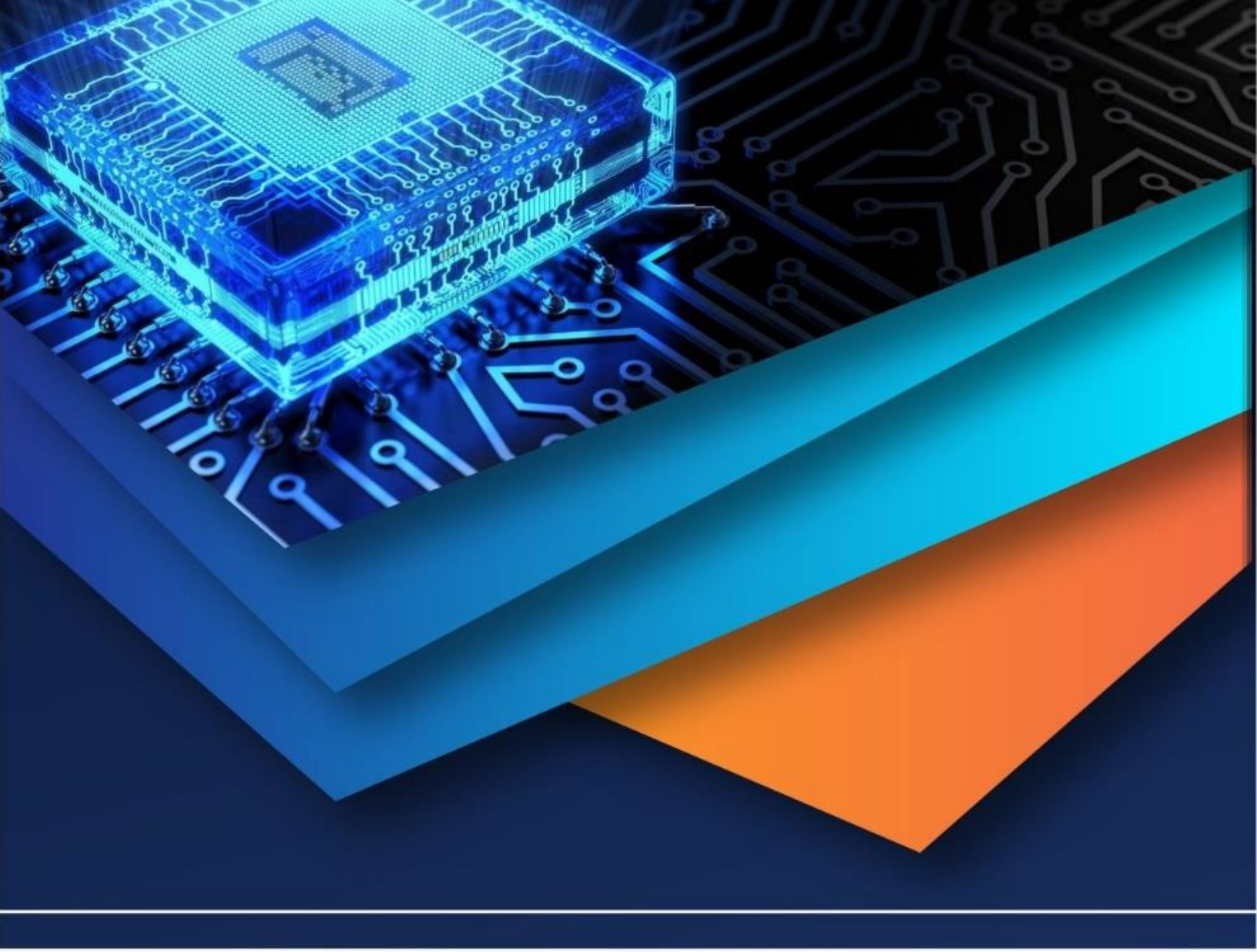

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