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Mode Code Authentication System Using Artificial Intelligence

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Abstract: ***To give physically handicapped and disabled persons a platform where they may set up a safe, personal account that only they can access. This method would make it possible for people with motor limitations to communicate with technology, and it would also boost authentication somewhat over typing in a code. This concept offers a catchphrase and lessens the use of modern hardware sensors. The primary goal of this initiative is to prevent fraud from occurring in government or bank zones. Comparatively speaking, eye trackers offer more security than any biometric identification. Eye trackers are the tools used to gauge visual activity. Users who are physically impaired may now use their eyes to communicate with computers thanks to this. This method aims to offer an authentication procedure that includes physically challenged individuals for everyone, including children and the elder people.***

Keywords: Authentication, Eye trackers, Biometric identification, physically impaired.

I. INTRODUCTION

In the fields of pattern recognition and computer vision, face identification has been a hot topic forresearch. It has a wide range of possible uses, including security, credit cards, surveillance, and passports. Several techniques have been put forth in recent years. The complexity of facial pictures in the field of face recognition necessitates a significant amount of computation time for categorization. By lowering the visual data's size, classification and subsequent recognition time may be slashed.

As is well known, the 21st century has seen significant support for advancements in authenticationand authorisation technologies. Since the late 1990s, personal identification numbers (PINs) have been utilised extensively for user authentication and security. We prefer to use a different strategy these days because PIN codes are so simple to hack. On the other side, PIN authentication using hands-free gaze-based PIN input techniques leaves no physical traces and so provides a more secure password entering alternative.

The term "gaze-based authentication" refers to locating the eyes across successive frames of a picture and monitoring their centres over time. Morse code will be used for password authentication, with dots and dashes serving as the representation of integers. With the use of a smart camera, this model shows a real-time application for gaze-based PIN entering as well as eye recognition and tracking for PIN identification.

The main objective of this project is to create a secure system to authenticate users who are not partially blind and to create a secure password authentication system which uses Morse code and to ensure that the required parts of the face are recognized accurately by the system. The user's user id and password are required to log in after registration. The PIN is input via a webcam and is converted to Morse with the helpof this. In the backend, the entered PIN is checked with the stored PIN which was entered into the database by the user while registering. If the entered PIN isn't correct, its exits the screen.If the entered PIN is correct, it displays successful authentication.

II. LITERATURE SURVEY

It suggests a Smart Eye monitoring device that is intended for the elderly and persons with impairments. The idea behind this study is to use eye movement to communicate with caregivers and operate wheelchairs and appliances. The image processing module[5], wheelchair control module, appliance control module, and SMS management module are the four parts that make up this system. The eye movement picture is taken and sent to the Raspberry Pi microcontroller for processing using OpenCV[4] in order to determine the coordinate of the eyeball. It presents a study that seeks to quickly recognise eye-ball movement patterns using the brain's brain machine interface (BMI)[1], which is thought to be an artefact of electroencephalograms (EEGs). We looked at the repeatability of eye movement ERP and the qualities that include constant, high voltage, and a 50ms quick response. This study suggests three techniques for extracting and identifying distinctive patterns brought on by various directional ocular motions as an ERP pattern discriminator.

We recently constructed a robot that can move in accordance with the motions of the eyeballs and can be activated with specific actions based on the eye blinks through the description of some of the projects. It finds measurements of a real master tennis player's and a novice tennis player's eye movements are suggested. The players' recorded eye movements are contrasted and examined. An eye-tracker is used to record the eye movements[7]. The main finding of this research is that newcomers have a propensity to momentarily pursue the tennis ball.

It suggests that many children with ADHD exhibit low academic performance. Due to their lack of focus and poor interpersonal skills, they also struggle in their social lives, which frequently lasts into adulthood.

This concept is interesting and uses less of the modern hardware sensors thanusual. Here, in order to strengthen security, we employ gaze-based authentication and a mouse click to turn numbers or alphabets into source code[18]. It suggests that many children with ADHD exhibit low academic performance. Due to their lack of focus and poor interpersonal skills, they also struggle in their social lives, which frequently lasts into adulthood. This research proposes a solution to the issue by introducing and showcasing the advantages of a novel kind of therapy[10]: an eye-contact game that effectively makes use of mixed reality technology. The technique is based on the signs of Haar, a collection of variously shaped black and white rectangular masks. The method sums the brightness of each pixel in the picture that is covered by the black and white portions of the mask before calculating the difference between these values. Any machine-learning technique may be used to assess the effectiveness of neural networks and can solve the issues brought on by more challenging data sets. One of the security criteria of general terminal authentication systems is that they be simple, quick, and dependable since people are most comfortable with the face authentication techniques that they use on a regular basis utilising traditional knowledge approaches like passwords.

This approach has been offered as a two-layered safety security framework to safeguard PIN number[11]s, where users may input the password with the appropriate eye points using Morse code. However, these techniques are not secure since malevolent observers can watch them. Eye blinking-based safety systems offer a potential system safety and usability solution since eye blinking is a natural manner of engagement. PINs are often used in many different contexts, such as ATMs, the authorization of electronic transactions, and the opening of doors and personal devices. Even when PIN authentication is employed, such as in financial systems and gateway management, authentication is frequently a problem[13]. It enabling those who are physically disadvantaged or disabled to create a secure, personal account that only they can access. It alludes to the widely used computer solutions[14]. The two biggest misunderstandings around cloud technology are data protection and privacy protection. Different strategies have been used to provide dependable data security in the cloud[12]. Morse code was one of the original forms of communication, but due to mobile communications, it is now seldom used. Perhaps none of us are more familiar with this gaze-based technique than someone who can tap Morse codes with his fingers.

III. PROPOSED METHODOLOGY

The model comprises of a back database and an interface. The user may interact with the system thanks to the GUI. In order to create it, Pygame or OpenCV are used. The user initially had to register in the frontend by giving their preferred user ID, a password (PIN), and a keyword. The user's user id and password are required to log in after registration. The PIN is input via a webcam and is converted to Morse with the helpof this. In the backend, the entered PIN is checked with the stored PIN which was entered into the database by the user while registering. If the entered PIN isn't correct, its exits the screen. If the entered PIN is correct, it displays successful authentication . If the user has forgotten his password then he can use the keyword to authenticate and update the prevailing password with a replacement one. Gaze-based authentication refers to finding the eye location across sequential image frames, and tracking eye center over time. Password authentication will done using Morse code, where numbers will be represented in dots and dashes. This model presents a real-time application for gaze-based PIN entry, and eye detection and tracking for PIN identification using a smart camera.

A. Facial Landmark detection

The landmark detection method identifies important regions in a picture of a human face. We have demonstrated the detection of emotion through facial movements, gaze direction, face alteration (facial swap), graphical face increase, and puppeteering of virtual characters. To do this, you mustlocate several places on the landmark detector's face, including the corners of the lips, eyes, jaws, and many more. OpenCV has a large number of designed and implemented algorithms.

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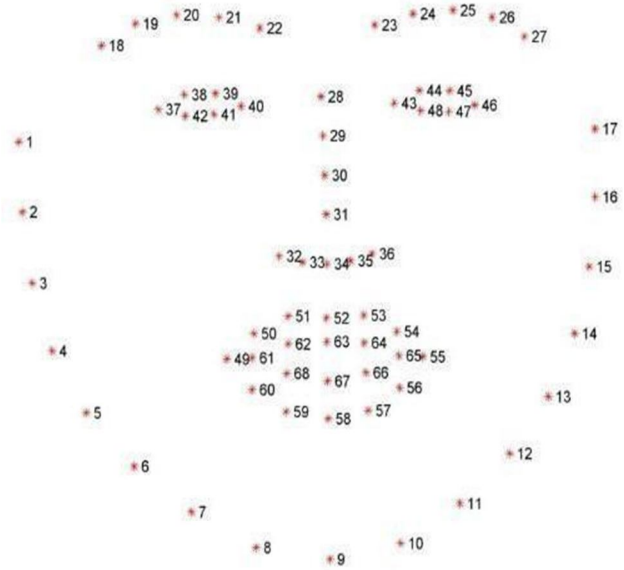

Fig. 1 displaying the 68 iconic landmarks onthe face

B. Applications

1) *Driven Monitoring:* Many auto accidents are the result of fatigued drivers, and smart vehicles' emergency stopping systems don't always work. It's helpful to keep an eye out for indicators of driver drowsiness to prevent accidents. For instance, a computer vision model may analyse video feeds from a car camera that recognises indicators of fatigue or inattention in the driver's face. If the driver isn't paying enough attention to the road, the model may send a warning. While wearable ECG tracking devices and built-in movement tracking systems can serve a similarpurpose, a computer vision solution is easier and less obtrusive. Using facial landmark inputs, neural networks can learn to recognise tiredness in drivers' faces.
2) *Animation:* Based on a small number of photos with annotated facial landmarks, face animation algorithms employ facial landmark identification to create animated figures. These algorithms can create additional frames for video games and cinema. Another use is to change the audio track in dubbed movies to match the face movements. The areaaround the mouth can be replaced with a modified 3D model using a facial landmark detection method. For lip-syncing jobs, the Pix2PixHD neural network is helpful, while the DeFA algorithm may create a complete 3D face mesh. Face representations may be created utilising borders and facial landmarks by using the Dlib package.
3) *Facial Recognition:* In this use case, algorithms are used to verify, recognise, and cluster faces (grouping similar faces). The best algorithms enhance facial recognition by using face preprocessing and face alignment. These techniques often locate landmarks and recognise faces using multi-task cascaded convolutional networks (MTCNN). Motions of the lips, eyes, and eyebrows can be used to identify emotional emotions. Emotions may be recognised using facial landmarks.

C. HAAR Cascade Detection

According to Paul Viola and Michael Jones' work "Recent purchases utilising the Cascade of Enlarged Artefacts," the purchase using the Haar-Platform is a useful technique for item discovery. In a machine learning process, Cascade's work is taught by several positives and negatives. Then, items are discovered in other images. The algorithm first needs a lot of positive photos (facial photographs) and negative photos (faceless pictures). Then, we must draw out its functions. Now, numerous functions are computed using all kernel sizes and locations. To compute each component, we must get the total of the pixels beneath the black and white squares. They provided an essential solution in their illustration, however many of the traits we have described are ineffective. According to Paul Viola and Michael Jones' work "Recent purchases utilising the Cascade of Enlarged Artefacts," the purchase using the Haar-Platform is a useful technique for item discovery.

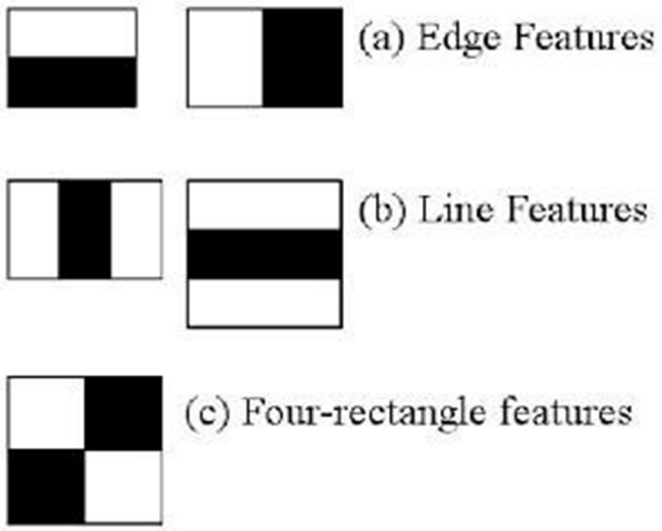

Fig. 2 HAAR Features

1) *Edge Features:* These frames look for edges (simple enough). Keep the forehead and the eyes/eyebrows in mind while thinking about face detection. An exposed, flat part of the face is theforehead. It can reflect more light as a result, making it appear "lighter" more often. Typically, eyebrows are darker. The computer would interpret the lighter forehead colour and the change from light to dark brows as a "edge" boundary.
2) *Line Features:* The pattern can be either black-white-black or white-black-white (like an Oreo). Consider a nose in relation to our last example of face detection. While not as flat as the forehead, the top edge of your nose, which extends from the bridge to the tip of your nose, is nevertheless reflecting, making it the brightest and most noticeable part of your face since it is the closest point to a light source that could be in front of the subject. The region surrounding the nose is usually darker because it bends away from the light. A line feature would be seen in this pattern. Eye- tracking technology is yet another intriguing use for Line characteristics.
3) *Four-Rectangle Features:* This is useful for spotting highlights and diagonal lines in a picture. This works best when utilised on a small basis. The borders of the jaw, chin, wrinkles, etc., can be seen depending on the illumination. These are often qualities that aren't as crucial for broad face recognition since there are so many of them and so many variances in each person's face that a sluggish algorithm might only be able to recognise specific faces. Or put another way, very specialised.

IV. IMPLEMENTATION

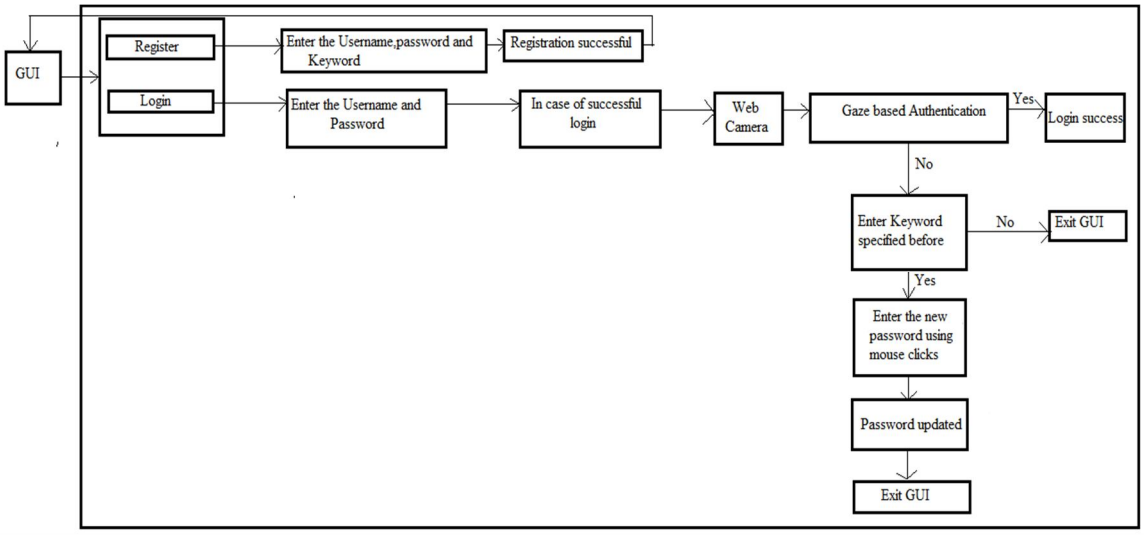

Fig. 3 Initial system design

A. *Proposed Algorithm*

1) *Step 1:* First, the model has a user interface. The GUI is designed to enable user interaction with the system. It is used to make OpenCV or Pygame.
2) *Step 2:* Using a user ID, password, and keyword, the user must first register on the frontend. Following registration, users may log in using their user ID and password. Using a web camera, the PIN is captured as Morse code.
3) *Step 3:* The saved PIN entered by the user during registration is used to verify the entered PIN in the backend. If you input the PIN incorrectly, it exits the display.
4) *Step 4:* It exits the monitor if the PIN you entered is incorrect. The authentication will appear to besuccessful if the entering PIN is accurate. If a user forgets their password, they can use the keyword to confirm their old password with a new one

$$\text{Pixel value} = (\text{Sum of the Dark pixels/Number of Dark pixels}) - (\text{Sum of the Light pixels/Number of Light pixels})$$

B. *Results*

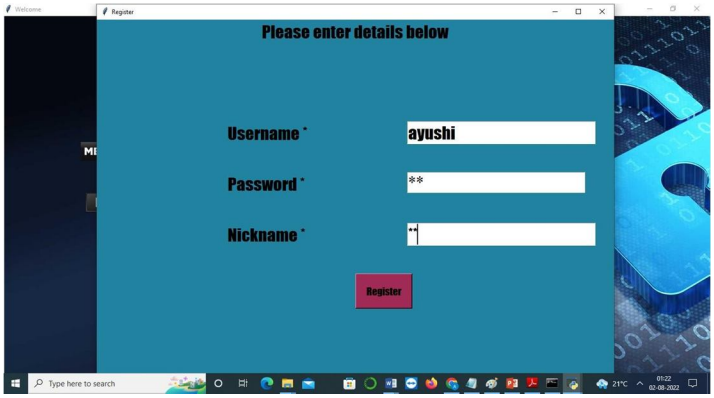

Fig. 4 Home terminal of the system with register terminal

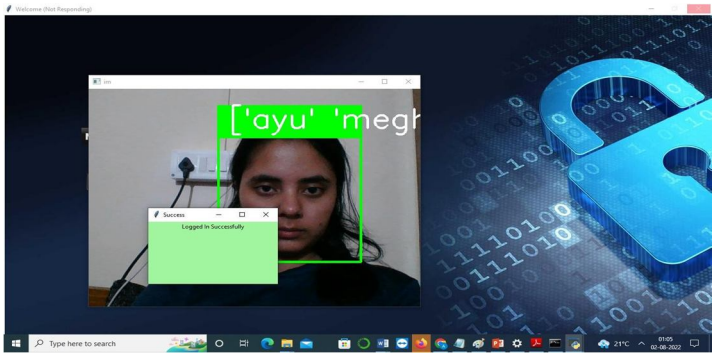

Fig. 5 Step1: Facial Recognition

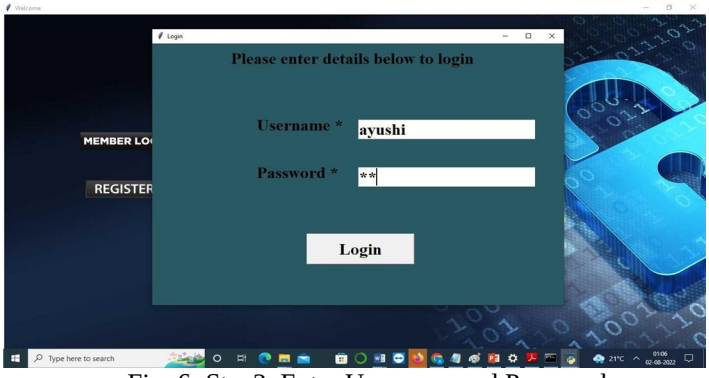

Fig. 6 Step2: Enter Username and Password

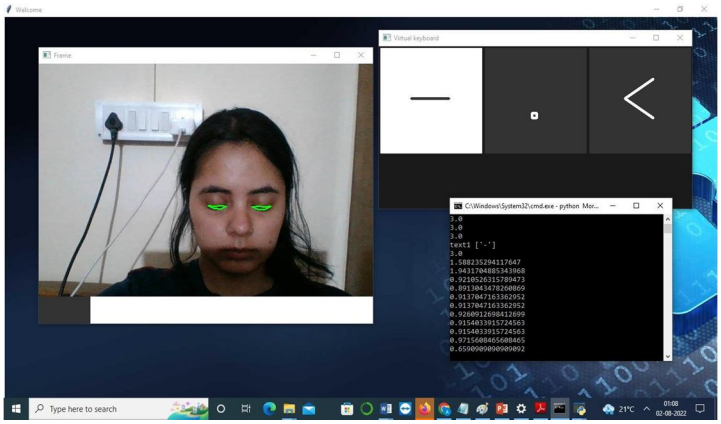

Fig. 7 Step3: Enter password through eye blink

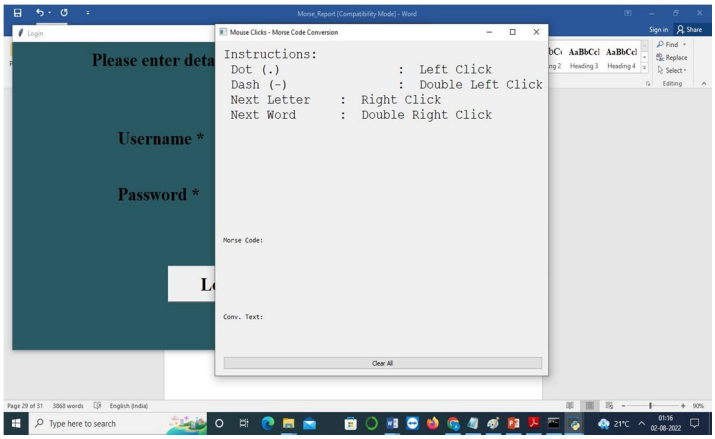

Fig. 8 Reset password using mouse clicks

V. CONCLUSIONS

In essence, our project offers two factors for authentication. Essentially, two authentication factors offer two security levels to safeguard a system or account. In order to strengthen security, we employ gaze-based authentication and click mouse to transform numbers or alphabets into source code. Additionally, this effort aids disabled individuals in self-authentification. People of all ages who have a rudimentary understanding of Morse code can utilise this approach. We attempt to incorporate facial recognition for every user with the Morse Virtual Keyboard eye-blink to input the password as a further advancement.

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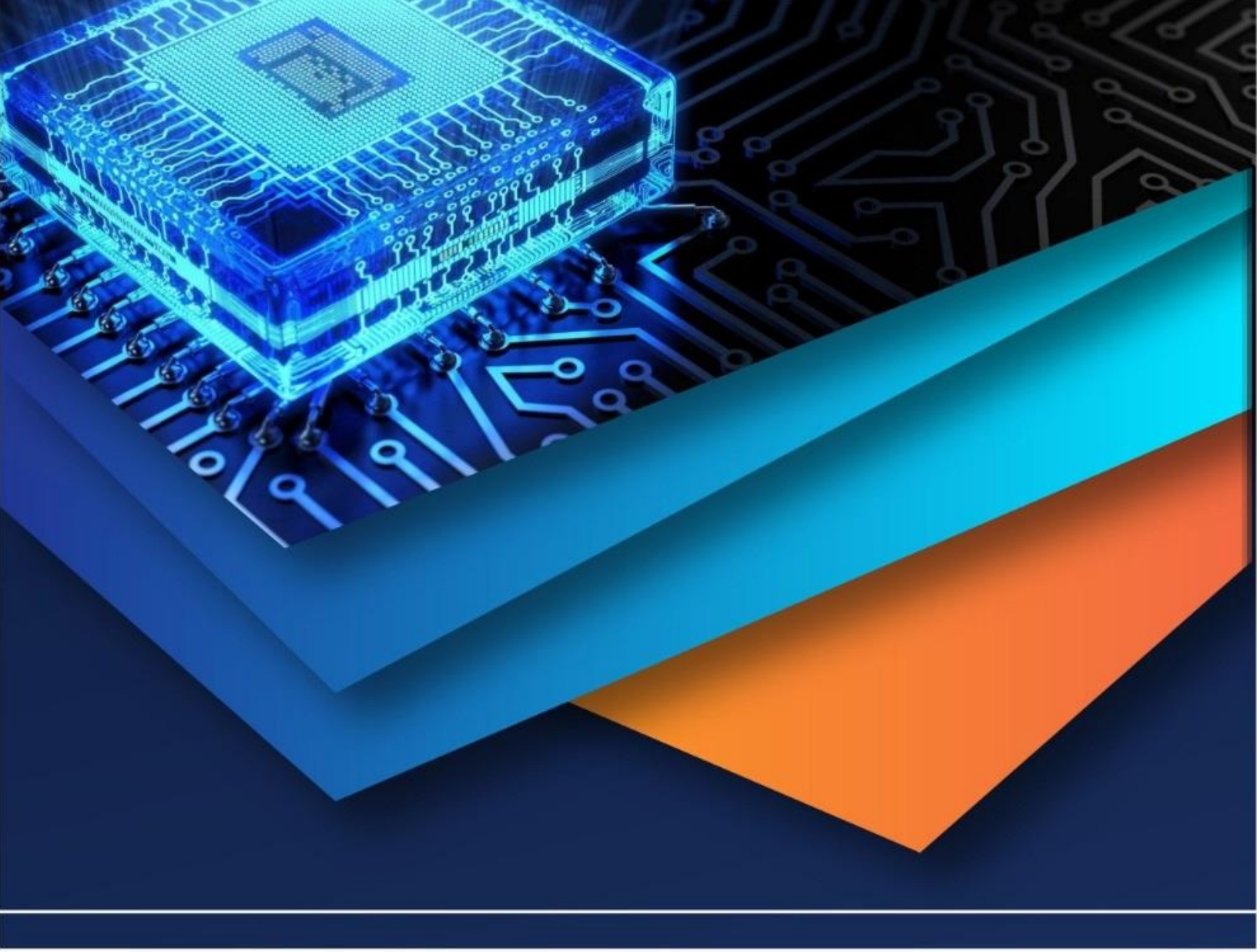

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