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Sign Language Recognition for Deaf and Dumb

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Abstract: ***The only features human beings use to communicate with each other are speech and vocabulary. Because of our ability to hear, we can see one another's feelings. In order to give instructions right now, we can even use speech recognition. But what if it can't be heard and you can't finally talk about it. Visual communication continues to be the main contact method of people with developmental disabilities and deaf people, and automatic comprehension of sign language is therefore a comprehensive area of study intended to ensure their independent lives. With the use of image recognition and artificial intelligence, a number of techniques and innovations have been proposed in this field. For recognize or convert the signs into an appropriate sequence, each simple sign detection system is built. In this article, the dual-handed Indian foreign languages are collected as a collection of images and interpreted with the aid of Python and then converted into speech and text. The proposed approach is meant to give voice to speechless persons.***

Keywords: Image processing, noise removal, feature extraction and matching, static and dynamic gesture.

I. INTRODUCTION

Sign languages are vibrant on a world-wide basis. There are several sign languages in the country that are widely used, such as ASL (American Sign Language) ISL (Indian Sign Language), BSL (Bangladesh Sign Language), MSL (Malaysian Sign Language). These languages are designed and created with a lot of effort and realistic research to make it possible for mute people. Any language shall be developed with its term and its meaning. This Language is created as "Sign" and "Action of the Sign." And we can't help them understand the significance of a symbol by writing a phrase here. Since they're deaf and cannot listen from birth, we can't teach certain terms.

Artificial intelligence is an implementation of machine learning (AI) that allows structures it's opportunity can continuously know or build on knowledge without being directly programmed. Artificial intelligence focuses on the development of computer programs which can view information and data about themselves.

The principle of identification of gestures is to create a context in which individual human gestures can be recognized and used for the transmitting of knowledge. A camera shows the motions of the human body in a gesture recognition device and transmits data to a device that uses gestures as inputs to monitor devices or applications. Creating a human-computer interface is the concept of creating a hand motion recognition system by using recognized movements to access usable data.

II. LITERATURE SURVEY

Sr no.	Name of paper	Author	Year of Publication	Findings
1.	A Novel Feature Extraction for American Sign Language Recognition	Ariya Thongtawee, Onamon Pinsanoh, Yuttana Kitjaidure	2018	In this paper, a novel approach for hand recognition based on edge of binary image using 2D camera was proposed.
2.	An effective sign language learning with object classification using ROI	Sunmok Kim, Yangho Ji, and Ki-Baek Lee	2018	They introduced a new sign language learning method that extracts hand area as the ROI before learning, using object detection network.
3.	Bangla Sign using SIFT & CNN	Shirinultana Shanta Saif, Taifur Anwar	2018	In this paper they have used CNN for sign detection which was never used.

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III. PROPOSED SYSTEM

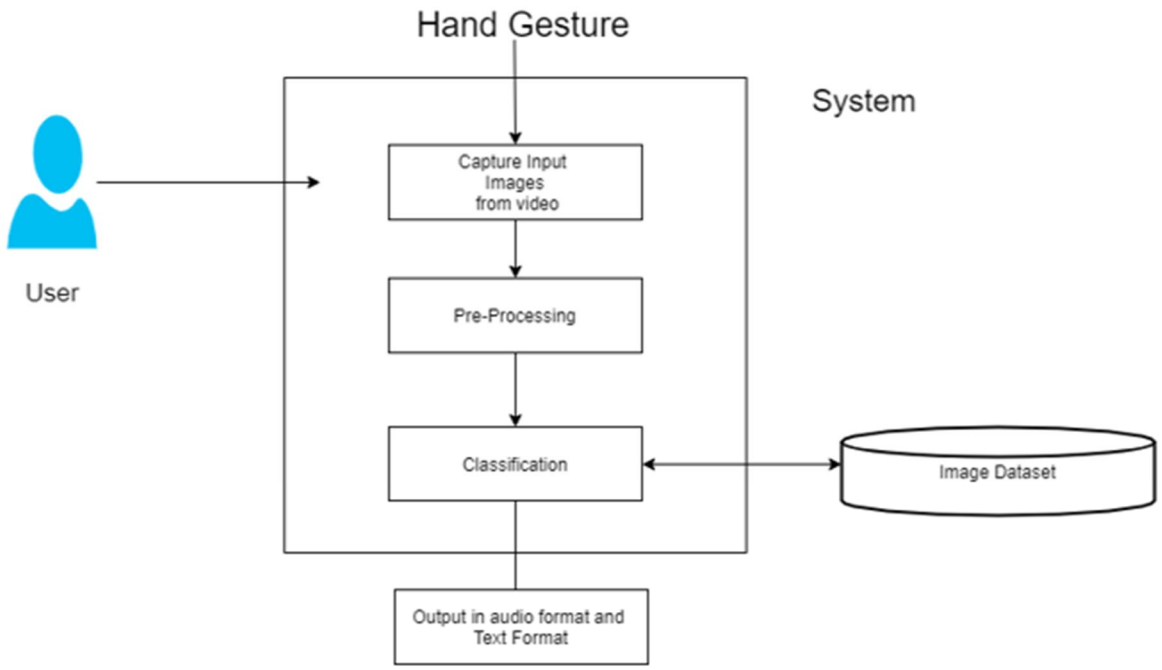

Figure 1: Block Diagram of Architecture of the System

The system will use machine learning algorithm i.e CNN Convolutional Neural Network. Our planned model will be trained with around 2000-5000 images and with increasing epoch in order to increase accuracy. The reason we are using CNN is it has multiple layers hence it will help into training model with easy manner. We will use Open Computer Vision Technology simultaneously to interact with camera, to take live input from camera. We will set and define different signs with images and that images will be trained with algorithm. Person will have to perform sign in front of camera. After taking live input from camera the sign will be recognized. Recognized sign will give text output and it will be translated to audio sound.

IV. ALGORITHM USED

A. *Convolution Neural Network*

1) *Convolution Layer:* The first building block in our plan of attack is convolution operation. In this step, we will touch on feature detectors, which basically serve as the neural network's filters. We will also discuss feature maps, learning the parameters of such maps, how patterns are detected, the layers of detection, and how the findings are mapped out. Step 1(b): ReLU Layer The second part of this step will involve the Rectified Linear Unit or ReLU. We will cover ReLU layers and explore how linearity functions in the context of Convolutional Neural Networks. Not necessary for understanding CNN's, but there's no harm in a quick lesson to improve your skills.
2) *Pooling:* In this part, we'll cover pooling and will get to understand exactly how it generally works. Our nexus here, however, will be a specific type of pooling; max pooling. We'll cover various approaches, though, including mean (or sum) pooling. This part will end with a demonstration made using a visual interactive tool that will definitely sort the whole concept out for you.
3) *Flattening:* This will be a brief breakdown of the flattening process and how we move from pooled to flattened layers when working with Convolutional Neural Networks.
4) *Full Connected:* In this part, everything that we covered throughout the section will be merged together. By learning this, you'll get to envision a fuller picture of how Convolutional Neural Networks operate and how the "neurons" that are finally produced learn the classification of images.

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V. RESULT

The gesture image made by deaf and dumb people is segmented using CNN algorithm. After the segmentation is done, the database stored is compared with the segmented image taken for testing and the corresponding output will be displayed. Figure (6),(7),(8) represents the input gesture images for Digit as "3", Alphabet as "R" and Word as "Best Of Luck".

Figure 2: Homepage

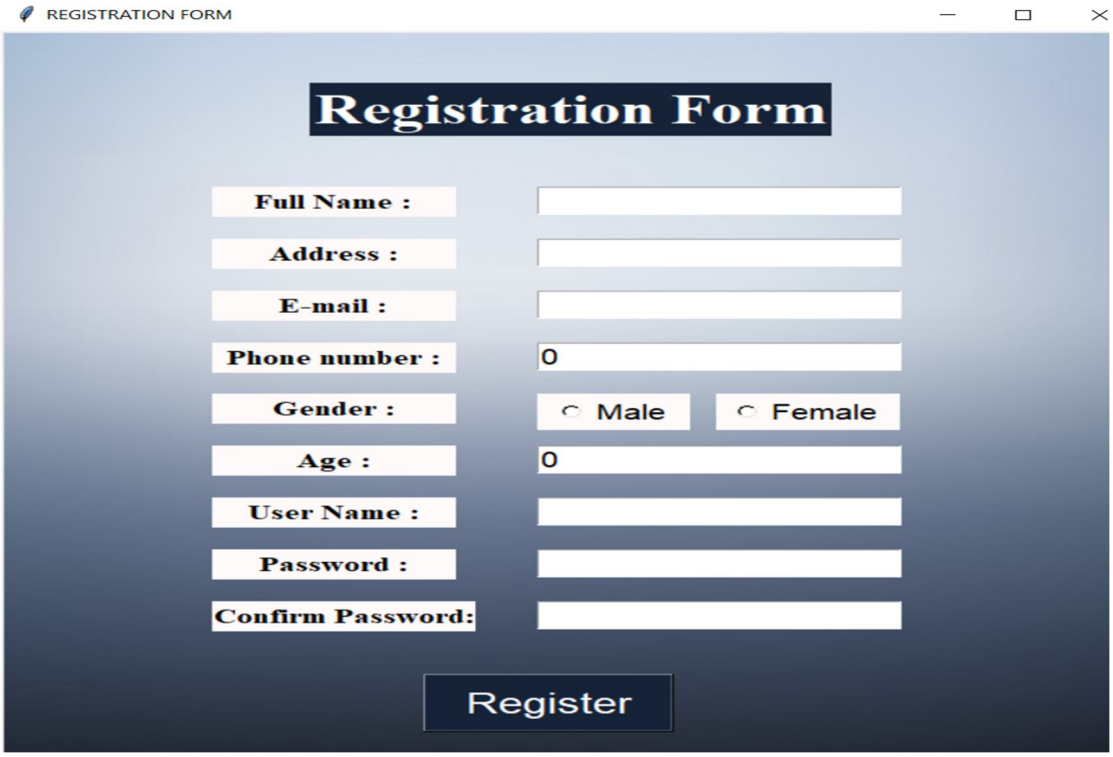

Figure 3: Registration page

Figure 4: Login page

Figure 5: Sign Recognition

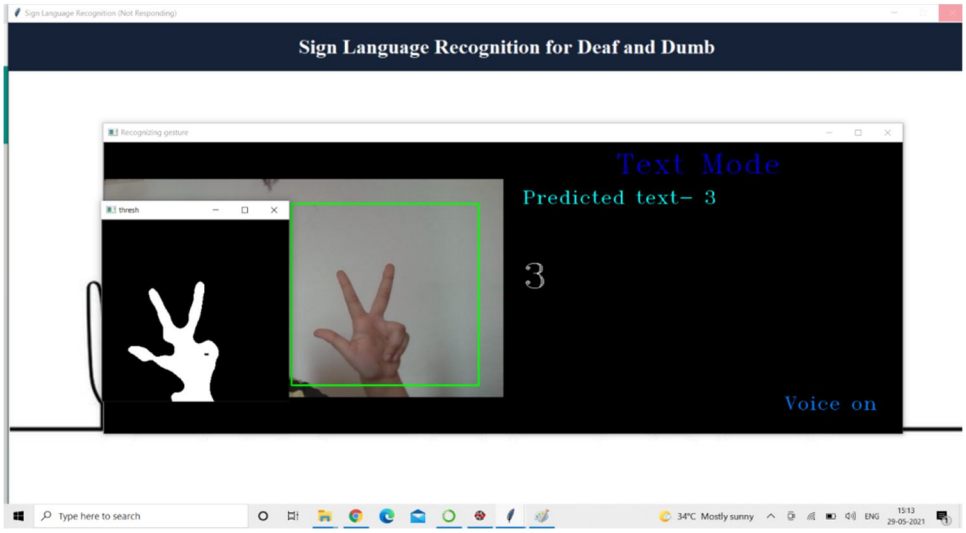

Figure 6: Sign predicted as 3

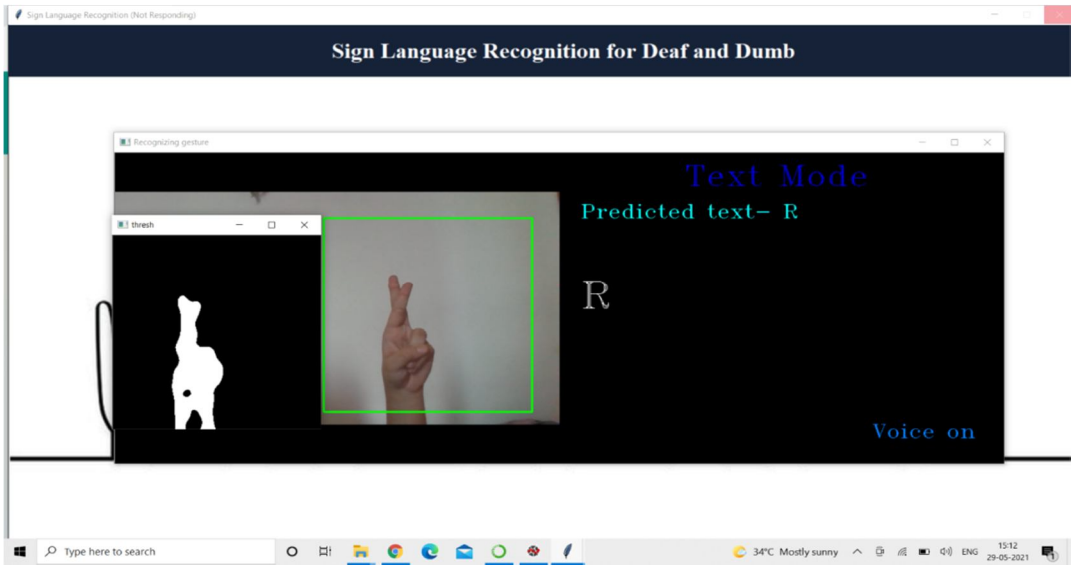

Figure 7: Sign predicted as R

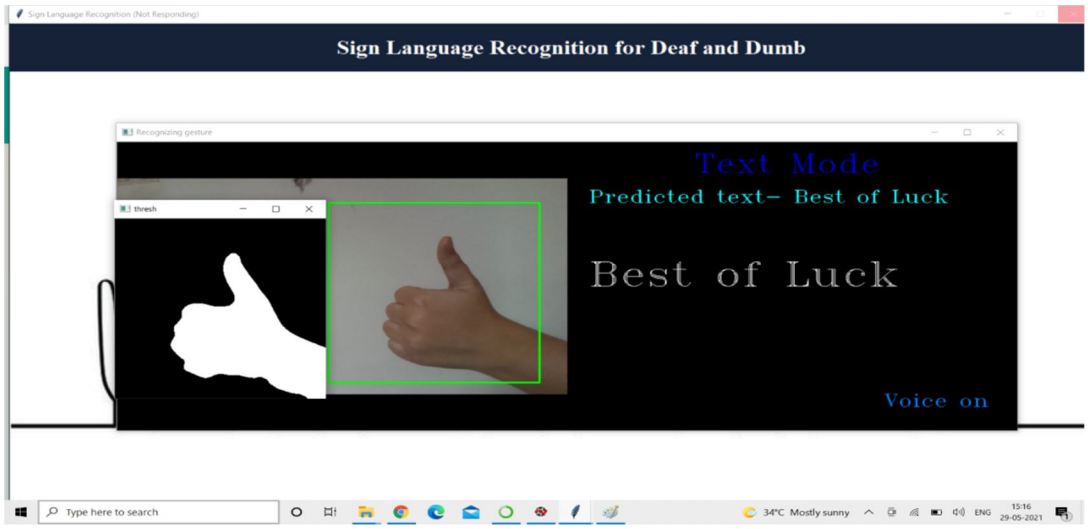

Figure 8: Sign predicted as Best of Luck

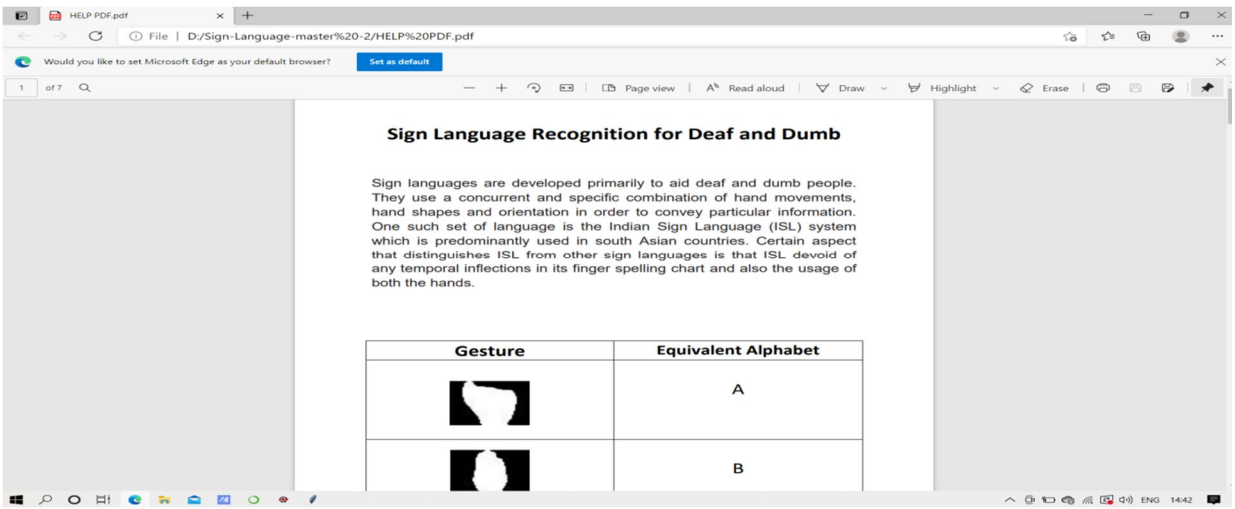

Figure 9: Guide

VI. CONCLUSION

The initialization was then achieved for recording live streaming of the camera. Two motion detections, like a palm and a hand, of a green rectangle shaped by integral pictures. The second stage is the extracted text of the file, which is compared to the stored positive negative integral image dataset and performs the fingertip monitoring by signal detection.

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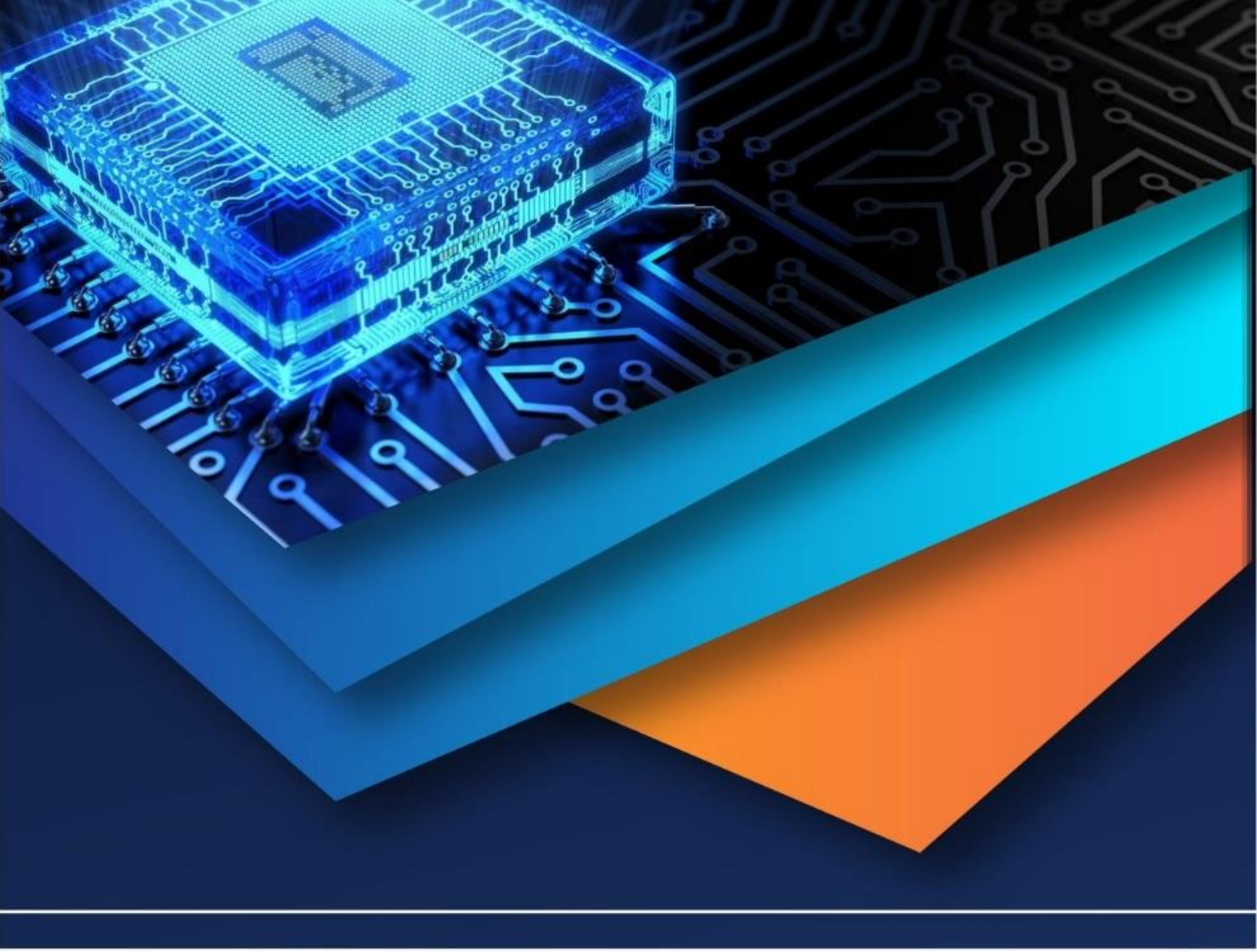

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