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Security Features Analysis of Indian Currency for Recognition and Authentication

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Abstract: ***A currency note is a type of a negotiable instrument made by a bank, payable to the bearer on demand. The Indian Rupee is the official currency of the Republic of India. Counterfeit money is imitation currency produced without the legal authorization of the state or government. This has led to the escalation of corruption hindering country's growth. For country like India Counterfeit note is one of the biggest hurdle in the in cash transactions. Because of the fast developments in imaging, scanning and printing technologies it is very easy for a person to create fake currency notes with use of advanced software and hardware tools. Currency Recognition and Authentication has various potential applications including electronic banking, currency monitoring systems etc. This paper made an effort to explore the various security features of the highest denomination. Counterfeit of currency of denomination 2000 and 500 will be a very difficult task because as many security features are embedded in the newly introduced currency notes which makes the currency of highest denomination more secure. This papers is an efforts towards the Security Features Analysis of Indian Currency that can be used for Recognition and Authentication of genuine currency note.***

Keywords: Counterfeit Currency, Bank Note, Security features, Watermark, Recognition and Authentication.

I. INTRODUCTION

The currency plays an essential role in our daily life. Every day we are dealing with currency for different purposes, so recognition and authentication of currency is an important part of today's world and also is a one of the an assistive way for visually impaired persons to judge the originality of the currency.

For country like India Counterfeit note is one of the biggest hurdle in the in cash transactions. Because of the fast developments in imaging, scanning and printing technologies it is very easy for a person to print fake currency notes with use of latest software and hardware tools. Currency Recognition and Authentication has various potential applications including electronic banking, currency monitoring systems etc.

The main objective of this paper is to get familiar with the new security features which are added to new 2000 and 500 currency notes so that they can differentiate between Counterfeit and genuine currency notes with simple examinations.

Automatic machine which can detect currency notes are now commonly used in dispensers of modern products like candies, soft drinks bottle, bus or railway tickets. The technology of currency recognition and authentication basically aims for identifying and extracting visible and invisible features of currency notes.

This paper has made a small effort in revealing the security features of the highest Denomination 2000 currency note which has been newly issued by the Government of India. The currency note shares some similar features with the other denomination currencies around the world such as the Micro-printing, 3D Security thread, Watermarks, Colour shifting Ink Intaglio printing. Forging the note with all the above mentioned features is impossible.

II. LITERATURE REVIEW

Counterfeiting of money is not a new problem and has been present since the coinage of money was started by the Greek in around 600 B.C. During that time, the edges of coins were used to be clipped off to get valuable metal and the metal was used to make counterfeit coinage. [1]

Paper money came in existence in 1200s in China using the wood of mulberry trees. During that time, the guards used to look after mulberry forests and counterfeiting of money were punishable by death. History tells us that counterfeiting of money has been an old evil [2].

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Security features of a currency are critical for determining real and fake currencies. Common security features include watermarks, latent images, security thread, intaglio, optically variable ink, micro lettering and fluorescence [3].

Physical testing of currency notes are not efficient and it is difficult for anyone to recognise the difference between Counterfeit Currency and Real Currency. Therefore Automatic methods for bank note recognition are necessary. Extracting sufficient monetary characteristics from the currency image is essential. Involving machines makes notes recognition process simpler and efficient. [4]

III. SECURITY FEATURES OF CURRENCY NOTES

Here are the security features on new Rs 500, Rs 2,000 notes. In the aftermath of government demonetizing Rs 500 and Rs 1,000 notes, we have received the new currency notes, here is a list of security measures that have been taken to avoid counterfeiting.

A. Security Features of Rs 2,000 Note

The base colour of this note is magenta. And, with the dimensions of 66 mm × 166 mm, having a theme of Motif of Mangalayan - India's first venture in interplanetary space. It is smaller than earlier banknotes of various denominations. Here are some features with respect to the numbers mentioned in the image.

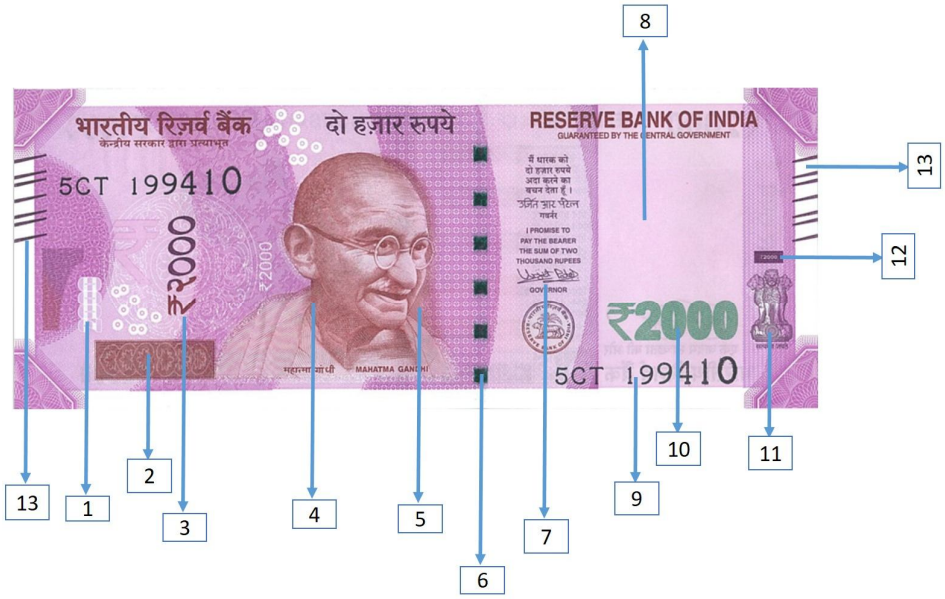

Fig. 1: Salient features on the Front of the Rs.2000 Banknote

1) See-through register with denominational numeral 2000.
2) Latent image with denominational numeral 2000.
3) Denominational numeral in Devnagari.
4) Portrait of Mahatma Gandhi at the centre.
5) Micro letters 'RBI' and '2000' on the left side of the banknote.
6) Windowed security thread with inscriptions and a colour shift from green to blue when the note is tilted.
7) Guarantee Clause, Governor's signature with Promise Clause and RBI emblem towards right.
8) Mahatma Gandhi portrait and electrotype (2000) watermarks.
9) Number panel with numerals growing from small to big on the top left side and bottom right side.
10) Denominational numeral with Rupee Symbol.2000 in colour changing ink (green to blue) on the bottom right.
11) Ashokan Pillar emblem on the right.
12) Horizontal rectangle with 2000 in raised print on the right.
13) Seven angular bleed lines on left and right side in raised print.

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For visually impaired Intaglio or raised printing of Mahatma Gandhi portrait, Ashoka Pillar emblem, bleed lines and identity mark.

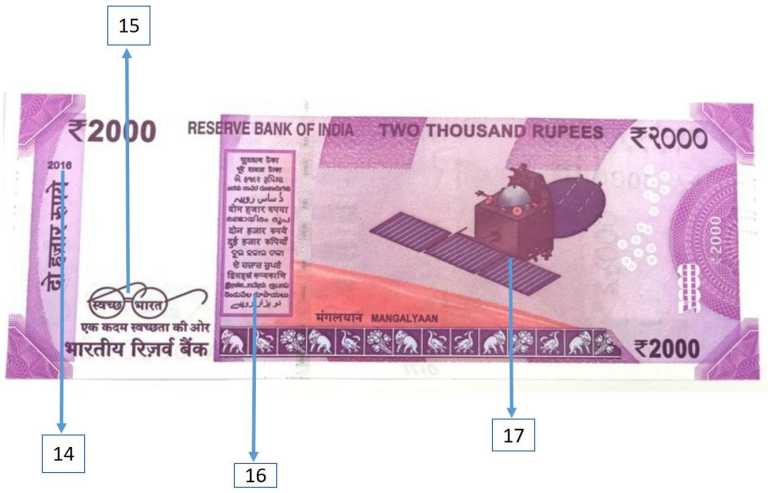

Fig. 2: Salient features on the Back of the Rs.2000 Banknote

Year of printing on the note
Swachh Bharat logo with the slogan
Language panel towards the centre
Motif of Mangalyan - reflecting country's first venture in the interplanetary space

B. Security Features of Rs 500 Note

The base colour of this note is Grey. And, with the dimensions of 63 mm × 150 mm having theme of Indian Heritage Site - Red Fort.

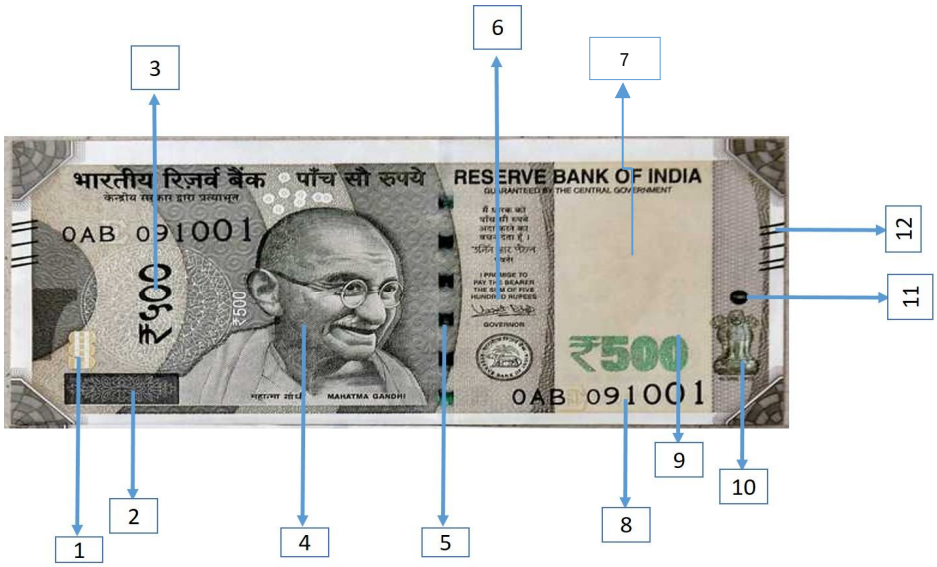

Fig. 3: Salient features on the Front of the Rs.500 Banknote

1) See-through register in denominational numeral.
2) Latent image of the denomination numeral.
3) Denomination numeral in Devnagari.

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4) Mahatma Gandhi's portrait in centre facing to right.
5) Windowed security thread that changes colours from green to blue when the note is tilted.
6) Guarantee clause, Governor's signature with promise clause and RBI emblem tilted towards the right
7) Portrait and electrotype watermarks.
8) Number panel with numerals growing from small to big on the top left side and bottom right side.
9) Denomination in numerals with rupee symbol in colour changing ink (green to blue) on the bottom right.
10) Ashoka pillar emblem on the right.
11) Circle with Rs 500 in raised print on the right.
12) Five bleed lines on left and right in raised print.

For visually impaired Intaglio or Raised printing of Mahatma Gandhi's portrait, Ashoka pillar emblem and an identification mark.

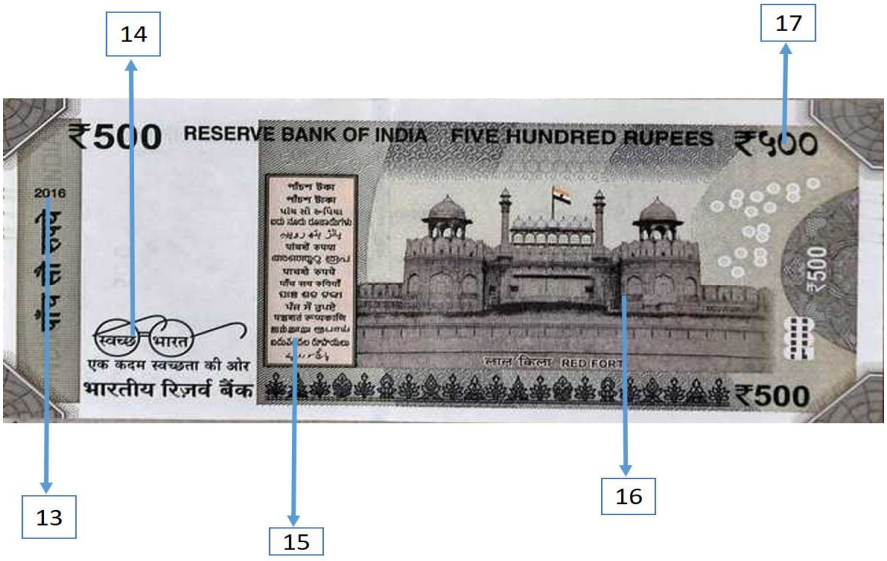

Fig. 4: Salient features on the Back of the Rs.500 Banknote

13) Year of printing of the note on left
14) Swachh Bharat logo with the slogan.
15) Language panel towards the centre.
16) Red Fort with Indian flag.
17) Denomination numeral in Devnagari on right.

IV. DETAILED SECURITY FEATURES OF DENOMINATION VALUE RS. 2000

Security features are the various authenticating features that have been incorporated in the Indian currency notes of various denomination value in order to protect them for counterfeiting. Although it is very difficult to copy and forge these security features with precision, various attempts have still been made by the forgers to counterfeit the currency notes to the possible limits. In order to curb these illegal activities of the counterfeiters and to avoid such forgeries and being cheated, it is very important for the people to have an idea about the various security features that are present in the Indian currency notes and the various other documents containing these features.

The various security features present in the Indian currency note of denomination value ₹ 2000 and those observed in the photocopied and scanned currency notes are discussed in this present study.

The present study focuses on the as many as twelve security features that makes the currency note of highest denomination more safe guard and secure.

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A. Watermarks

Watermarks are the designs that are generated in the currency notes incorporated during the manufacturing process by varying the distribution of fibers in the given space. The various watermarks that are present in the 2000 denomination note are

1) Mahatma Gandhi Portrait
2) 2K Watermark
3) RBI Watermark
4) 2000 WATERMARK
5) Electrotype Watermark

Fig. 5: Mahatma Gandhi watermark

Fig. 6: 2K watermark

Fig. 7: RBI watermark

Fig. 8: 2000 watermark

Fig. 9: Electrotype watermark

B. See Through Register

The see through register refers to the denomination numeral 2000 that is printed on both sides of the note, on one side, it is hollow and on the other side it is filled up. It is written horizontally just along the micro lettering and above the latent image on the left side of the currency note. It looks like one single design when seen against the light.

Fig. 10: See through register both obverse & reverse

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C. Bleed Lines

Seven angular bleed lines in 5 sets of 1-2-1-2-1 are printed on the obverse in both, the upper left and the right hand edge of the notes to aid the visually impaired.

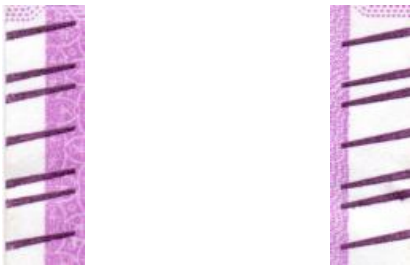

Fig. 11: Bleed Lines of Right and Left Side of Note

D. Identification Mark

Identification marks are made on banknotes to help the visually impaired identify the denomination of notes. On Indian banknote of denomination value 2000 it appears on the right side of the watermark window. The mark in this denomination is a rectangle located above the Ashoka Pillar Emblem on the right side and has 2000 numeral written in the rectangle.

Fig. 12: Identification mark

E. Micro Lettering

Micro lettering refers to the minute inscriptions that can only be read under a microscope or by using a hand lens/magnifier. On the Indian currency note of denomination value 2000 are encrypted “RBI 2000 INDIA”. These words are written alternatively on the left side of the currency note and The words INDIA BHARAT (Hindi) are alternatively inscribed on the left and right side of the clothes of Mahatma Gandhi near the neck and The word RBI is written on the inside of the frame of the spectacles of Mahatma Gandhi.

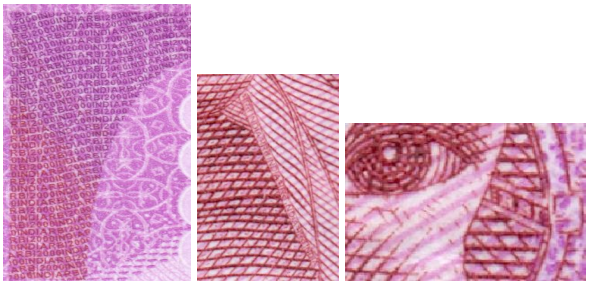

Fig. 13: Micro lettering

F. Omron Feature

Omron feature refers to the circle-shaped anti-copy feature located on the left side of the note just above the latent image.

Fig. 14: Omron feature

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G. Optically Variable Ink

The denomination value 2000 in the Mahatma Gandhi watermark window of the 2000 currency note is printed on the obverse using optically variable ink. The numerals change its colour when viewed at various angles.

Fig. 15: optically variable ink (Green)

Fig. 16: optically variable ink (Blue)

H. Intaglio Printing

Inscriptions or motifs printed using the Intaglio printing or raised printing technique can be felt by touch. On Indian banknote of denomination ₹ 2000, the portrait of Mahatma Gandhi, the Reserve Bank seal, guarantee and promise clause, Ashoka Pillar Emblem on the right, RBI Governor's signature are printed in intaglio.

Fig. 17: Intaglio printing

I. Security Thread

The security thread in the 2000 denomination currency note is a 3mm wide strip, usually 6 windowed and reads three words particularly "RBI", "BHARAT" and "2000" imprinted on it alternatively with the security thread changing its colour from green to blue on being held at an angle and tilted.

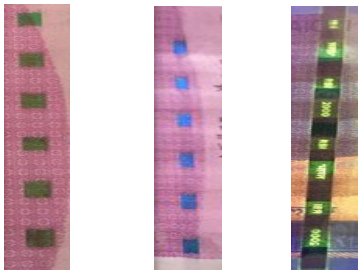
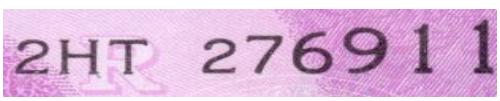


Fig. 18: Security thread when viewed at different light/ angles

J. New Numbering Pattern:

The numbers in both the number panels tends to increase from left to right while the first three alpha numeric characters remains constant in size.



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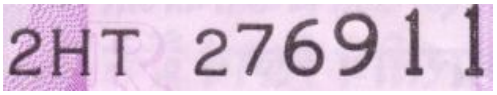

Fig. 19: Number panels at top left and bottom right.

K. Latent Image

The latent image is a safety feature that is covered within the note. It is visible only when it is held horizontally at eye level. The obverse of Rs.2000 currency note come with a horizontal band towards the down left of the currency note and encompasses a latent image featuring the denominational value in numeral.

Fig. 20: Latent Image of 2000 Denomination.

L. Geometrical Patterns

The note exhibits other designs and geometrical patterns aligning with the overall colour scheme. The geometric pattern on the left and the right corner of the note when joined forms a complete pattern

Fig. 21: Geometrical patterns on the left and the right corner of the note

V. CONCLUSION

The paper is study of detailed information about the various distinct security features that are embedded in the original Indian currency note of the denominational value 2000 and 500, which are easy to recognize and can be easily identified and observed with the naked eyes. This study also exposes the features that do not appear in the photocopy and scanned currency notes so as to offer a better knowledge and idea about variance in the genuine and fake currency. Every individual must have knowledge about these security features in order to prevent the counterfeiting of currency notes.

REFERENCES

[1] Binod Prasad Yadav, C. S. Patil, R. R. Karhe, P.H Patil , "An automatic recognition of fake Indian paper currency note using MATLAB", IJESIT, Volume 3, Issue 4, July 2014.
[2] NeeruRathee, ArunKadian, RajatSachdeva, VijulDalel, YatinJaie, "Feature Fusion for Fake Indian Currency Detection" 2016 International Conference on Computing for Sustainable Global Development (INDIACom), pp.1265-1270.
[3] Sagar S. Lawade1, Gayatri S. Hedau2, Apurva C. Ramgirwar3, "FAKE CURRENCY DETECTION USING IMAGE PROCESSING", International Journal of Research In Science & Engineering, Volume: 1.
[4] Saiyed Mohammed Arshad, Devdatt Sawant Sudagar & Nausheeda B S Fake Indian Currency Detection Usingimage Processing" International Journal of Latest Trends in Engineering and Technology, Special Issue SACAIM 2017.
[5] Anjali A1, Abhishek A, Uttam S and Priyanka V, "Comparison of Various Security Features of Genuine, Scanned and Photocopied Indian Currency Note of the Denomination 2000", Journal of Forensic Science & Criminology, Volume 5 | Issue 3
[6] Ingulkar Ashwini Suresh, Prof.P.P.Narwade, "Indian Currency Recognition and Verification Using Image Processing", International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 06 | June-2016.
[7] Saiyed Mohammed Arshad, DevdattSawantSudagar & Nausheeda B S, "Fake Currency Detection using Image Processing", International Journal of Latest Trends in Engineering and Technology Special Issue SACAIM 2017, pp. 598-602.
[8] First Post (2016) Rs 500 and Rs 1,000 banned: New Rs 2,000 currency note to feature Mangalyaan, raised bleed lines, November 9th India.
[9] Financial Express (2016), Rs 2000 currency note by RBI: 15 must-know salient features and how you can identify it, November 9th India.
[10] Samudranil (2016) What's Unique About The New Rs 500, Rs 2000 Notes? November 9th, Maps of India.

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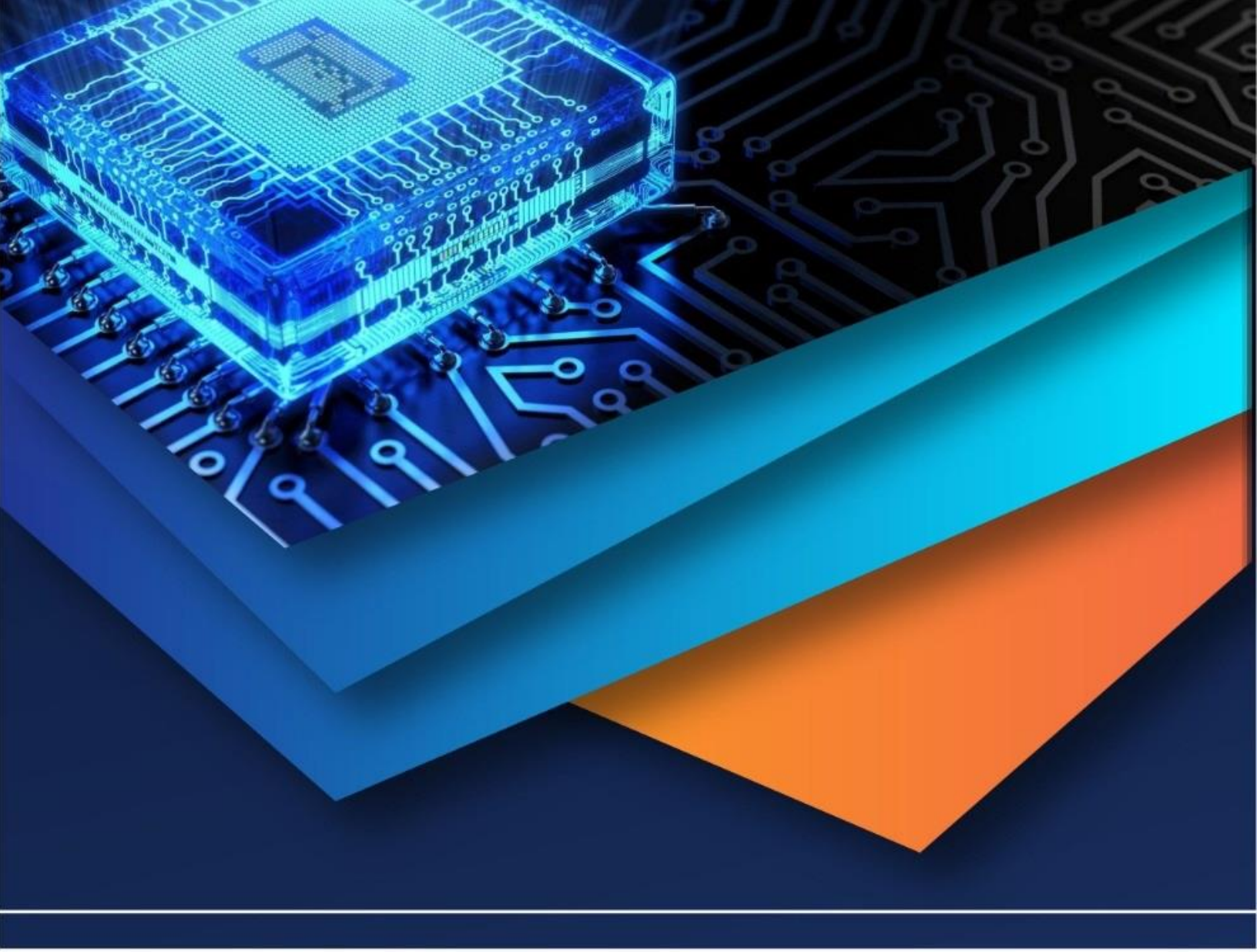

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