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Enhancing Cognitive Skills in Children through CogniHome: A Comprehensive Home-Based Training Solution

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Abstract: ***The future mental health of person is Depend on their childhood. To develop their cognitive skills in their childhood we are developing web application based on different technologies. CogniHome is also helpful to develop and increase their Intelligence Quotient (IQ). The abstract deals with the significance of cognitive skills. The IQ test in website is helpful for user to check their mental stage. User able to increase their cognitive skills using different Games, Therapies and Puzzles. Therapies include meditation, yoga, etc. which help user to stable mind. Puzzles and Quizzes are helpful to increase their IQ. The main purpose of CogniHome is to engage child in enjoyable and productive home learning experiences. Ultimately, the CogniHome is to enhance cognitive skills of child for their betterment future.***
Keywords: IQ Test, Cognitive Skills, Mind Games, Therapies, Brainstorming.

I. INTRODUCTION

This study focuses on helping children aged 4 to 16 grow in all aspects. Today, it's tough due to more time in front of screens, less play, and online learning because of COVID-19. We need special ways to help their thinking skills. To make learning fun, we suggest using things like puzzles, games, and creative projects. The key is to help kids set goals, celebrate achievements, and like learning. Encouraging curiosity is important too. We want kids to explore interesting things and ask questions.

Trying different things is a good way to help thinking. Kids should learn about many topics. Child can help by enjoying learning, solving problems, using devices less, and playing outside more. Children learn in different ways, so teaching methods should fit what they like. Being patient and supportive is crucial. This research looks at ways to develop thinking skills in children, considering today's challenges

II. LITERATURE SURVEY

An intersection of the digital era with education has led to the inception of "CongniHome," an innovative platform amalgamating cognitive skill enhancement with interactive technology. In early childhood (birth to age four), a substantial network of neural pathways is established, contributing significantly to brain development. Adel S. Elmaghrab, Tamer F. Mabrouk, and Ghada A. El Khayat are pioneering an intelligent web-based adaptive learning system tailored for children with average IQ[3]. Employing reliable diagnostic tests, the system recommends personalized therapeutic games and modulates play frequency via an inference engine. Interactive elements facilitate parental progress tracking through email updates. Initial evaluations and limited implementation have yielded positive user feedback. Future plans encompass innovative game development and cognitive skill improvement strategies for students. Given the limited resources available, the system's societal and economic significance is emphasized, acknowledging the collaborative contributions of organizations and experts.

In the realm of intelligence assessment, the Cattell-Horn-Carroll (CHC) Model has emerged as a prominent theoretical framework for evaluating intelligence-related abilities. Supported by substantial data, this model aids in interpreting scores, notably from assessments like the WISC-IV[4]. It facilitates the evaluation of various cognitive abilities encompassing verbal, visual-spatial, working memory, and processing speed, alongside measuring general reasoning competency and calculating IQ scores.

Thaweesak Yingthawornsuk, Kulmanachaya Sangsomporn, and Thanabut Jitjumlong are actively developing a game application focused on enhancing children's cognitive skills. This application incorporates four puzzle games designed to assess knowledge retention, memory, problem-solving, and observational abilities. The research reviews early development theories, spotlighting multimedia-enhanced multisensory learning. Recommendations for augmenting variety and engagement include introducing additional game modes, implementing a score user interface page, and providing individual game instructions.

The researchers' work extends to creating and refining gaming applications that elevate children's cognitive capacities while assessing the quality and user satisfaction of these educational games. They adopt an innovative approach, integrating math and color combination teachings via gamification in conventional educational settings. One such creation, "Balloon Shooter," aims to impart these skills in an entertaining yet educational manner[5].

The review encompasses an analysis of game development techniques and strategies necessary for educational games catering to children. Expert perspectives on educational game development emerge prominently, encompassing various games like picture matching, domino, object ordering, categorization, detail observation, and arithmetic games. Consequently, this comprehensive review encapsulates the evolution of ideas and approaches in the domain of enhancing cognitive skills, spanning from traditional perspectives to contemporary theories.

III. METHADOLOGY

A. *Description of the System*

The CogniHome project is an interactive cognitive development system that uses multiple methods to evaluate and improve children's cognitive capabilities. In the beginning the approach uses assessments of intelligence that are standardized with modifications for various age categories. Based on the outcomes of these tests, which serve as basic criteria, children can be classified into distinct cognitive development phases. The system next delivers a carefully selected group of engaging tasks and games that have been modified to fit each developmental stage that has been discovered. The goal of these interactive modules is to enhance and target a variety of cognitive skills, such as perceptual reasoning, memory, problem-solving, and critical thinking.

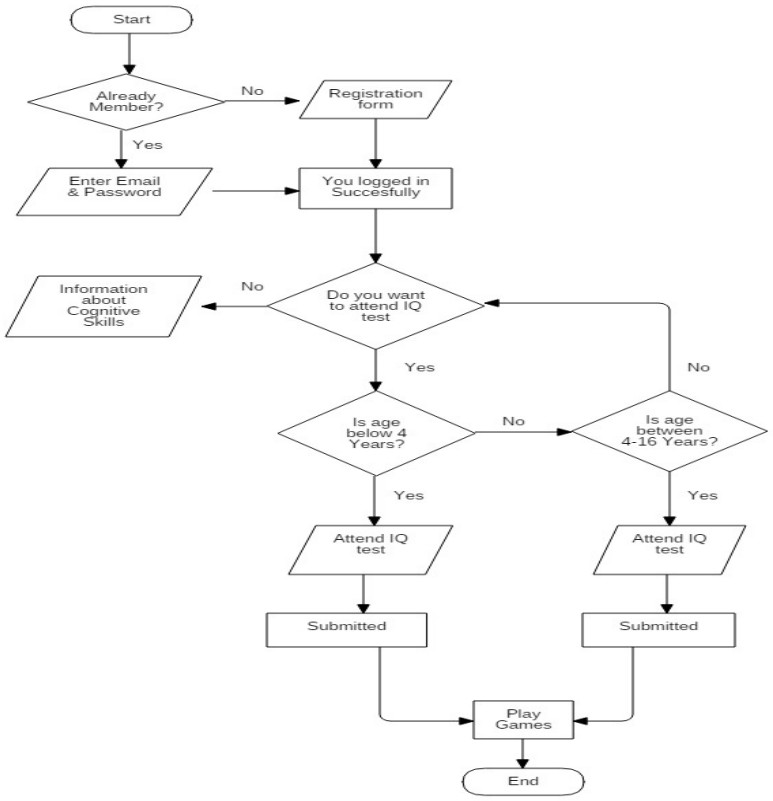


Fig 1. Flowchart of System

The crucial to fully understand and encourage children's cognitive development is the basis for the CogniHome technique's deployment. Using an IQ test as an initial assessment technique offers a systematic approach to evaluating and classifying children into distinct cognitive stages. Due to this stratification, interactive games and activities may be given in a way that is more suitable to the individual cognitive stage of each child. The method enhances the potential for cognitive enhancement by personalizing therapy to particular cognitive developmental needs, with the goal of improving children's overall cognitive growth and skill acquisition.

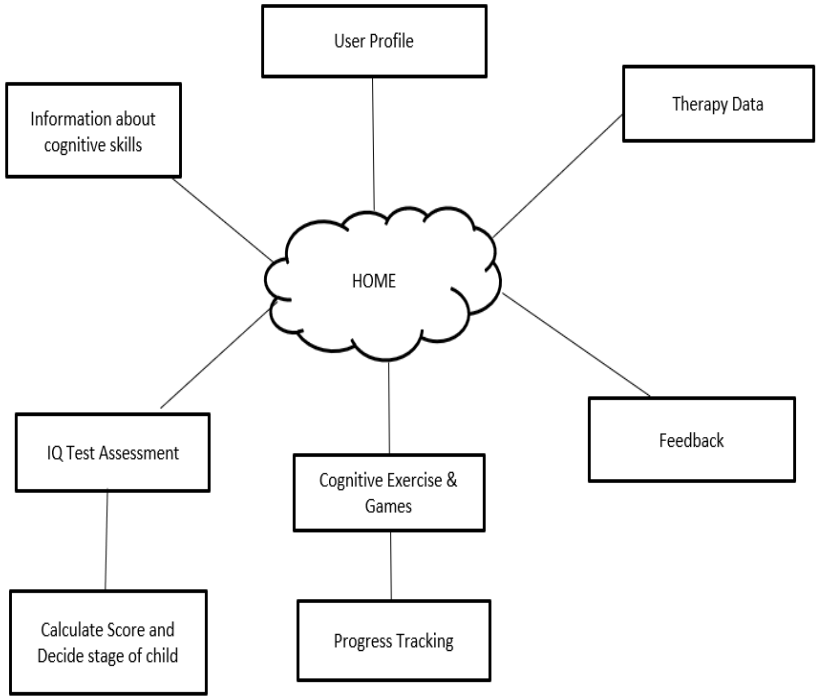


Fig 2: Proposed System Architecture

In addition, the implementation of interactive games within the system serves to the increasing demand for engaging and interactive techniques that enhance cognitive skills in children. These games provide an incremental and appropriate for development approach to skill development because they are intentionally constructed in accordance with cognitive stages. All things looked at, the CogniHome system is an advanced system that attempts to fill the gap between cognitive assessment and specialized therapy by creating an environment that is best for children's cognitive development.

B. Description of Data Collection

The method of collecting data for "CogniHome: Enhancing Children's Cognitive Skills" entails obtaining input and information that are necessary for the system's creation, training, and enhancement. User Registration data can be collected from the child or from the parents. The IQ test questions are completely based on Binet-Siman test. All the questions are form the Binet-Siman test. According to Binet-Simen test user able to calculate their mental age and according to it user can getting their IQ score. Based on IQ score there are 6 stages of child:

TABLE I
IQ STAGES

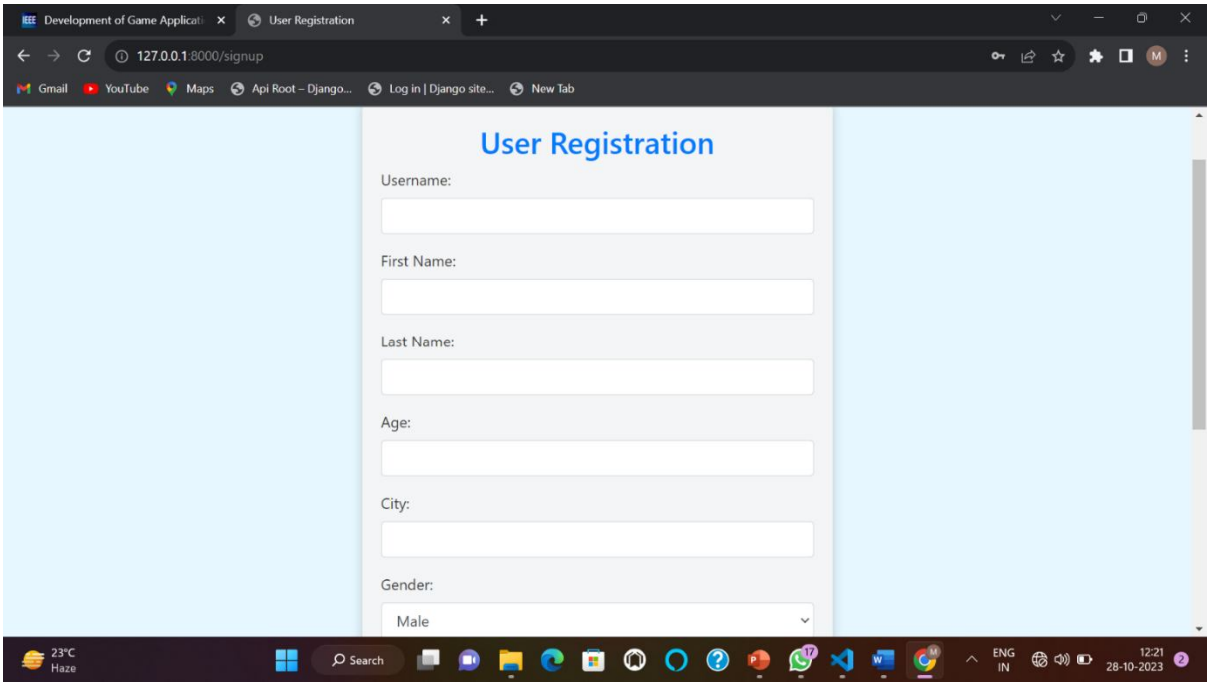
IQ Score	Stage
90-109	Average
110-119	Bright
120-129	Superior
130-139	Very Superior
140-179	Gifted
180-above	Genius

The IQ test is divided into two parts according to children age, first is of 4-10 years old children in which each question contain 1 score and total 20 questions in it. Second is for 11-16 years old children in which each question contain 2 score and it is of total 17 questions. The purpose of IQ test is to Understanding the child's cognitive abilities and baseline performance.

IV. RESULT

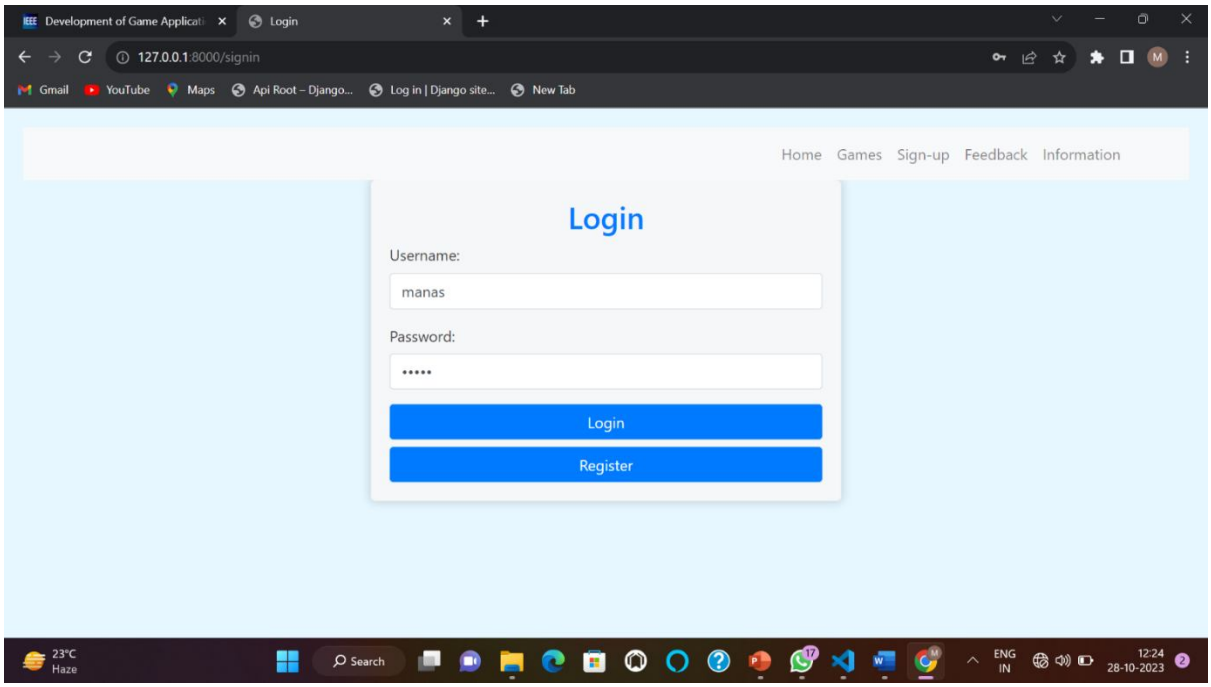
A. Registration

For using the all training sessions and to give IQ test user have to register first in the website. The Registration form contains different data which is given in below fig. After clicking on submit button user can get account activation link on their given mail id.



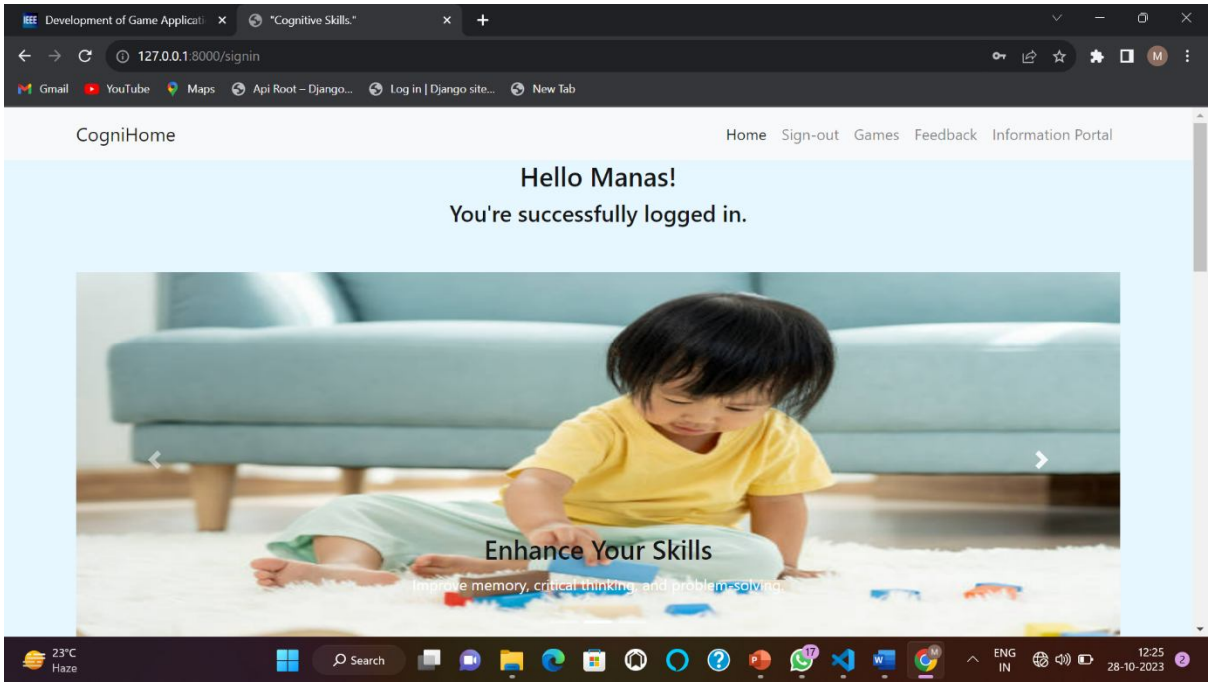
B. Login

After the registration and confirmation of email user can redirect to the login page which contains username and password. The username should be unique otherwise it will give pop-up message.



C. Home Page

After Login user can redirect to the home page of CogniHome. The home page navebar contains games in which IQ test and one demo game is available one feedback form is also available and Information portal contains all information regarding cognitive skills of child.



V. CONCLUSION

"CogniHome: Enhancing Children's Cognitive Skills" offers a ground-breaking approach to cognitive development. This all-inclusive system provides progress tracking, interactive exercises, individualized curriculum, and IQ Test. It was created with the needs of the user in mind. "CogniHome" aims to significantly influence young kids cognitive development and general well-being by establishing a stimulating and encouraging home learning environment that will boost their skills and future opportunities.

VI. ACKNOWLEDGEMENT

We express our heartfelt gratitude to all those who contributed to the realization of the "CogniHome: Enhancing Children's Cognitive Skills" project. This initiative would not have been possible without the dedication, expertise, and collaborative efforts of our guide Mr. D. A. Birari. This project stands as a testament to the collective effort and dedication of everyone involved. We look forward to the positive impact CogniHome will have on the cognitive development of children with disabilities.

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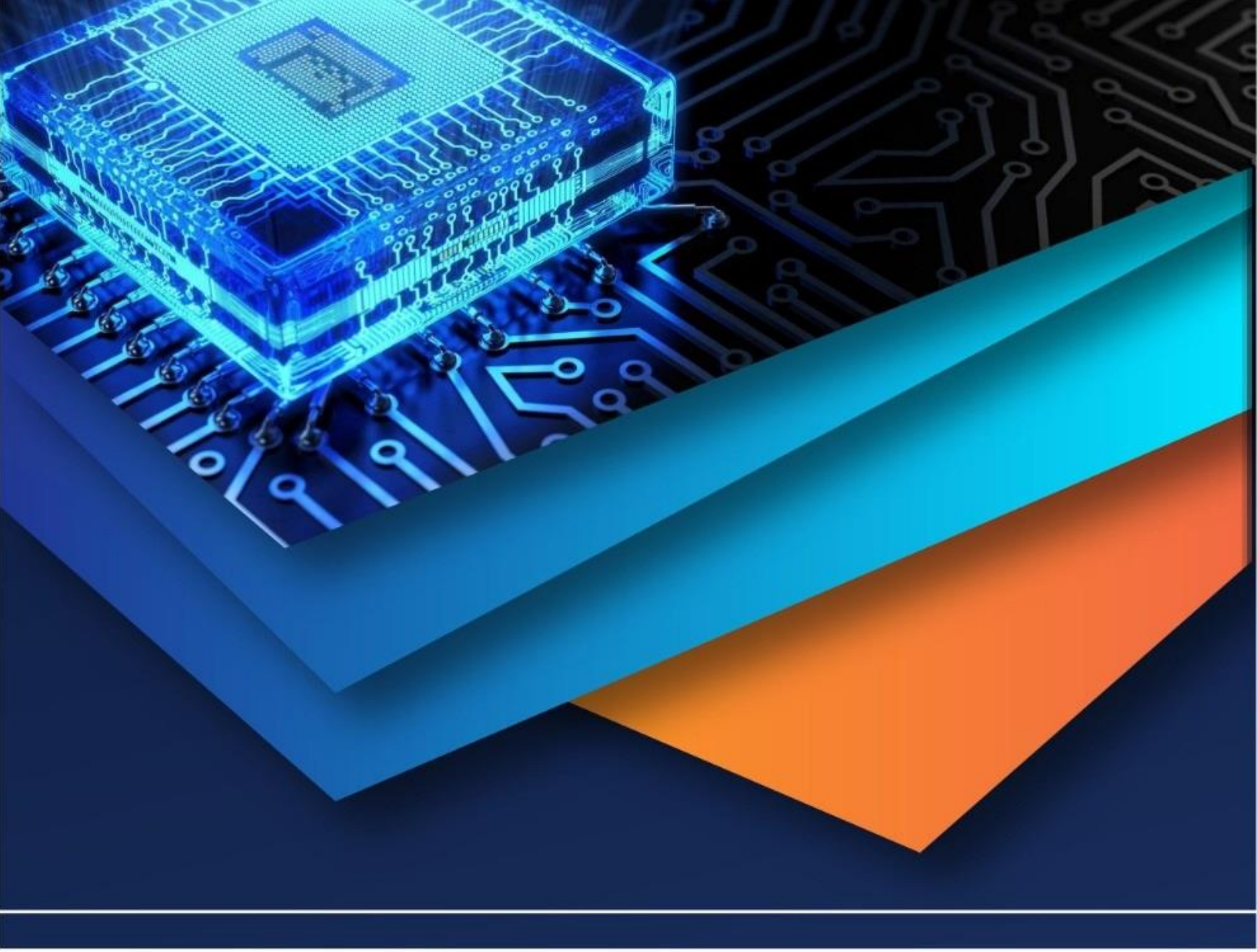

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