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# A Review on Healthcare Services Using Dual Chatbots as Conversational Agents

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***Abstract:*** ***A chat bot is an AI tool that interprets information provided by humans and responds accordingly. It is used to carry out tasks like mimic human behavior. Many of the chat bot conversations between humans and machines are repetitive. Instead of just talking to one another, a chat bot can communicate with the outside world by analyzing the user's needs and actions. Having a chat bot assistant that can help users complete their tasks makes them feel like they're doing something right. It eliminates the user's need to do the work for them. This idea has been proposed to introduce a dual-agent system that will allow users to interact with the chat bot without leaving the human interaction. It can make decisions on behalf of the user, which reduces the user's efforts in carrying out a task. This concept is demonstrated in our study. The concept is to create a chat bot that can diagnose a health issue & provide basic information before reaching out to a doctor.***

## I. INTRODUCTION

A chat bot is an artificial intelligence system that works seamlessly by acting like a human. It helps the user complete their task by delivering the most accurate and up-to- date information. Each chat bot has its own unique characteristics, which it uses to respond to the needs of users. It tries to fulfil the expectations of the users.

A chat bot is a type of AI system that helps users to perform various tasks without requiring them to interact with a human. It uses algorithms to collect and interpret the data it receives.

Most of the time, a chat bot and a user are having a repetitive conversation. In most cases, the user has to enter all the usual data that the user would typically enter in a regular conversation.

The proposed system helps users save time and effort by communicating with another chat bot on their behalf. It learns about the user’s needs and wants and takes appropriate decisions on their behalf. The rise of digital healthcare has brought about a paradigm shift in the way patients manage their conditions. This transformation aims at providing personalized Healthcare services and making them self-aware. The main benefits of using a conversation Healthcare chat bot are ease of use and accessibility.

## II. RELATED WORK

Our system is powered by the amazing work of RASA. Through its NLU, which is a natural language, it can easily understand and convert complex sentences into logical representations. Each intent has a parameter that denotes the probability that the given goal will be met. Thisparameter is called confidence.

Reference [1] Both NLU and NLG use a similar technique called collaborative reinforcement technique to help minimize the load on the user by remembering the past conversations. This method is very useful for minimizing the user’s load.

This chat bot has a single agent that can ask any question to it. It uses NLP to analyse the message sent by the user and determine its intent. It will use Natural language processing to identify its intent by analysing the message[2].

Chat bots are an integral part of our day to daylives and how they can substitute humans invarious fields. With the evolution of chat bots,we are now able to provide a more completeand efficient service to our customers. Theyhave closely studied how chat bots haveimproved and analysed what could be the future of chat bots. With the evolution of chatbots, we can now create a truly conversational agent that will allow people todo more tasks without requiring much efforton their part [3].

Reference [4] This paper presents an recognition approach that uses multi-modal approach. They have collected corpus of terms and expressions to learn and represent them using word vector. These studies are based on various AI methods to classify emotions. The studies train emotion classifications models using various AI techniques. It aims to develop a multi-modal approach to understand users' dialogues using NLP and NLG. The concept of emotion-recognition is used to collect corpuses of words and determine theirsemantic importance the concept of simultaneous learning wasdiscussed to explain how two agents can communicate with each another without a simulated user.

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How they improveconcurrently despite having a simulated userwhich minimizes the agent's interaction withthe user will improve during communicationamong them was discussed in the paper [5].

A web-based chat bot is developed, which is equipped with a voice-based recognition system. The chat bot is created as web-friend based on text. This project involves analysing and capturing an input signal to trigger a voice recognition system. The server used in this project is a black box approach based on SOAP [6].

This chat bot aims to communicate with humans. It stores the knowledge about the given sentence and comes up with a decision to answer the question. The RDBMS is used to store the knowledge of the chat bot. This chatbot learns about a given sentence and comes up with an answer based on its knowledge. The chatbot will also score the similarity of the given sentence. [7].

The chat bot implemented a pattern comparison method to save the order of the sentence in the input. It sends a response to the database after choosing a response from the list of available options. They have taken the input using text function and other punctuation [8].

A chat bot created using the same programming language as an framework that provides chat bot services to the users. It has been developed with a web-based chat bot API. The platform provides a wide range of features that allow users to simulate real- world problem-solving tasks. It also supports interactive problem-solving sessions [9].

## III. PROBLEM DEFINATION

There has been a growing interest in the use of chatbot technology for the provision of healthcare services. This paper aims to provide a deeper understanding of how these emerging platforms address the various aspects of the healthcare service provision. Chat bots in healthcare could help patients manage their medical conditions and improve their access to care. They could also provide them with immediate medical information. Chat bots are tools that can help users with healthcare information such as disease diagnosis and treatment. This will have a deep impact on the idea to reduce healthcare costs and provide better accessibility to medical knowledge through healthcare chatbot. With help of RASA-NLU we tried come up with themodel for the addressed concerns.

## IV. PROPOSED SYSTEM

The chatbot is developed for a specific domain where the user has not interacted with the system before. Once the system learns about the user's requirements, the chatbot takes the necessary actions. The user can either make a new interaction or the system can interact on his/her behalf. Socket Connection is a connection b/w the server and the client. It allows the server to communicate with the client without having to track it.

The system is partitioned into three parts:
1. Ionic or flask (tentative), 2. Server, and 3.MongoDB.

### *A. Front-End*

The user goes through the steps mentioned to get started with the system. After that, the usercan start working with the interface by providing basic details. The user can interact with the system by entering all the questions and queries related to the health. The system then interprets the query or questions as a series of words that the user wants.

The server that is listening and emitting events for the chat needs a connection to the network.This is done through a npm module that is called npm-socket-io. On the Security front, for secure communication between client and the server, HTTPis used.

### *B. Server and Conversational Agent*

The main function of any chatbot is to take the user's requirements and provide them with the most relevant information. This part of the system works seamlessly if the user providesthe required specifications for a new interaction.

When the conversation is completedsuccessfully, the extraction of entities takes place and then gets stored in the database. In case the user wants to speak to the system on user behalf, the system takes help of theprevious interactions to make the interaction more effective.

The server & the second agent carry out theconversation to get the value that the user has requested. The resulting value is then returned to the user.

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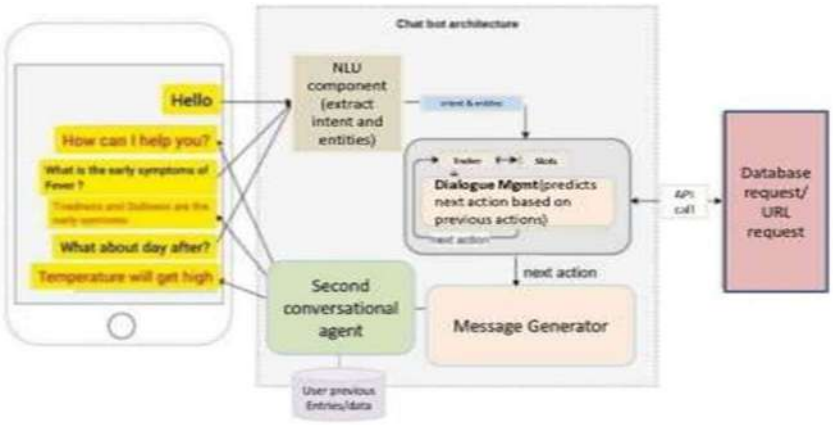


The NLU model is an open-source version of the NLP framework that provides a completeset of entities and intents that can be trained using predefined terms. This model is also more efficient to use for NLU. The server is the main component that operates the system. Its goal is to understand the message sent by the user and react in according with the help of RASA. It uses reinforcement learning and probabilistic models to learn how to respond efficiently to the user's input. The model is to be thoroughly trained to understand the language. The server then tries to answer the second agent's questions with defined intents. The model then generates the text that the second agent needs to understand. NLG is a technique used to generate responses by the server based on the intent of the user. The verb part of the response will be derived from the preference order's noun part. This method generates the noun and vice versa parts of the response. A server job comes with periodically monitoring the database to update the values of all the interactions entities that are associated with them. This ensures that the user can interact with the system favoured with the preference of the user. The preference analysis for each interaction is performed to give the best results. This method helps the user interaction more efficiently. The RESTful APIs manage the sever-side functions. The chatbot's events are managedthrough the same server. The Python-shell is used to run the pipeline processes for thechatbot's functionalities. Socket events are used to control the fluency of the interaction b/w the two agents in the event of preference order.

1) *2nd Conversational Agent:* The 2nd agent is the part of the server that contains all the details that the user requested previously{entities}. It sends the users' sentence to the server so that it can be filteredto get the most important details. The second bot checks in the system the exact match of the ordered details and the intents. It then based on the gathered information selects the best & most appropriate option. The first sentence of the query is followed by the server's response and the bot's output. The second agent sometimes might ask about the information which is not yet asked in the previous conversations to the server. This query is then sent back to user. The system is created in such a way that it provides clear access to theuser and it enables him/her to communicate with the server without any intermediaries.

*C. MongoDB (Database)*

Mongo DB is a high-performance, object- oriented database platform that allows developers to create and consume data without having to manage complex relationships with the data. The users and their data will be stored in one database, the information requested will be stored in the other. Its unique feature is that it gives the users complete freedom from the constraints of SQL. For instance, if a user has interacted regarding COVID-19 multiple times, then the preference of the user will be COVID- 19 which is more frequently used.

## V. FUTURE SCOPE

The chatbot can easily perform various tasks with the help of predefined rules and procedures. It can also learn more about the user and make more informed decisions based on its findings. The next step for this project can be a emotional tracker which can be used to help not just users with health issues (physical illness) but also those who are suffering from mental stability, I believe chatbots can be a revolutionary idea if trained well they can be a psychologic solution for people who are introverts which helps them that the fact that they are talking or chatting with a bot.

Despite the advantages of chatbot technology, healthcare organizations are still not able to capitalize on the opportunities it can provide completely. We can aim to identify the various roles of chatbots and to provide a framework for designing and implementing effective chatbot services for the concerns mentioned above.

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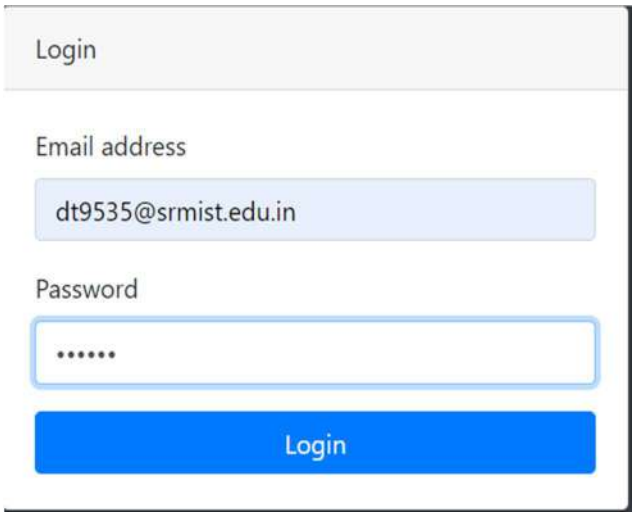
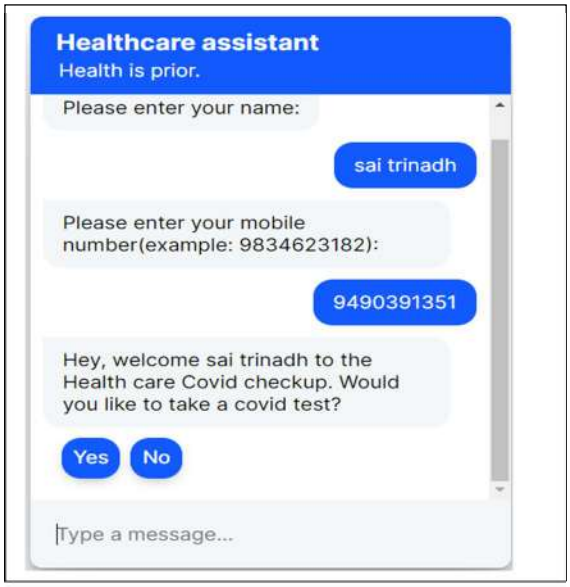
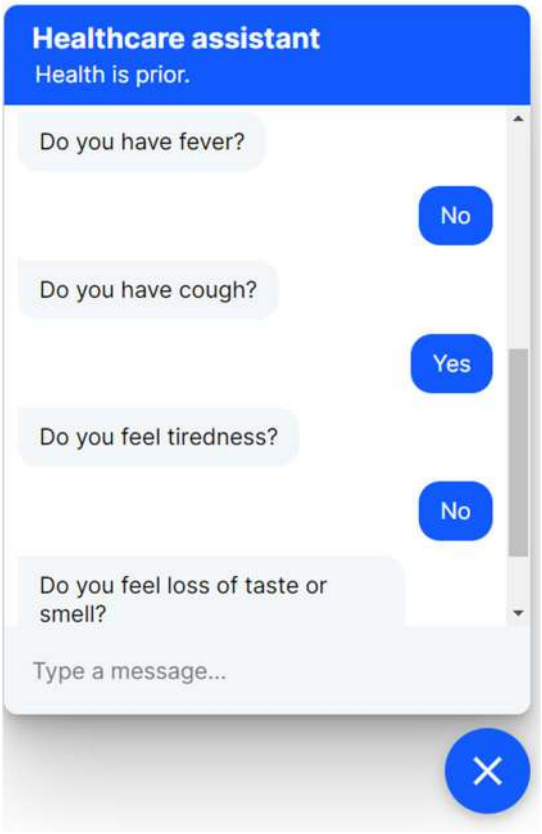
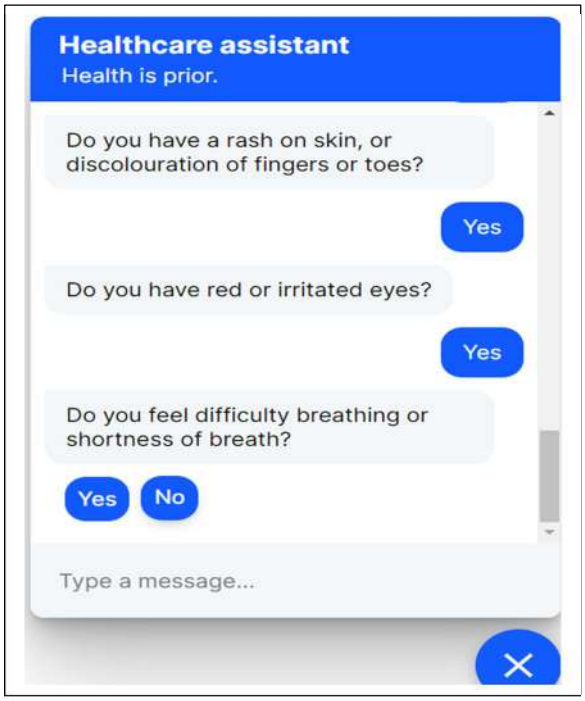
## VI. RESULTS

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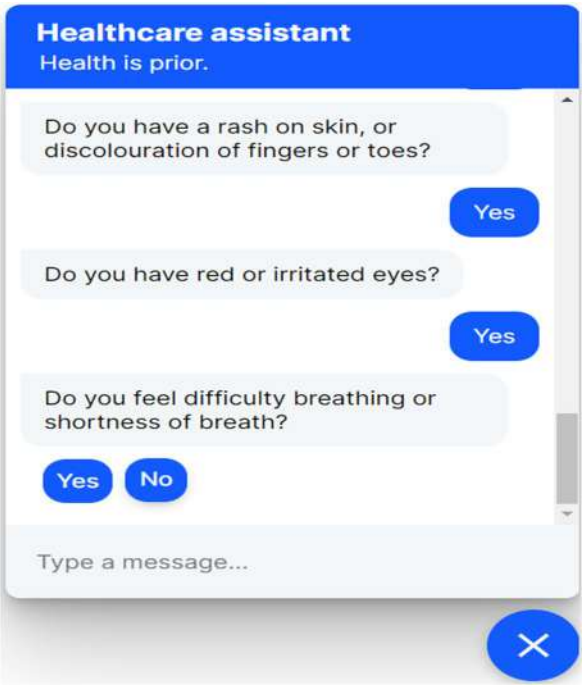


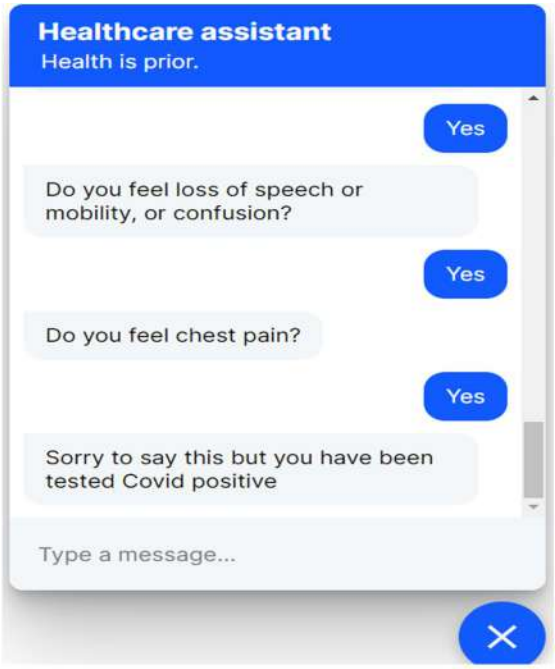


## VII. CONCLUSION

We proposed a system in this paper which can adapt to the user characteristics and take the entities of their previousinteractions as a training data in a sense, while a new user interacts with our system,

It will be totally in users hands to communicate for the first few interactions, later as the interactions go on the preferences from the user previous data willbe collected and used to minimize the user need to communicate and provide with best appropriate responses.

As we are focusing on healthcare department, if a user who had alreadyinteracted with the system previously willhave the facility to choose to interact with the system completely by themselves or the user can opt for 2nd conversational agent to do the interaction on his/her behalf. For example, a user who already interacted for 5 times of which he/she used fourinteractions to query about symptoms of corona virus, that would become his/herpreference and them when they interact again, he/she can just choose to be answered on the previous query basis. Which will eliminate the whole process of explanation happened in the previous interactions. We took help of RASA-NLU for this process in which after the user enters theirmessage , intents and entities will be extracted , which will get further processedby dialogue management where tracker andslots sections take place later in the nextstep the message generator comes into playafter which by users choice2nd conversational agent takes the message generated and tries to simply it more using the entities extracted from the previous interactions of the user, then finally the message will be displayed for the user on the display.

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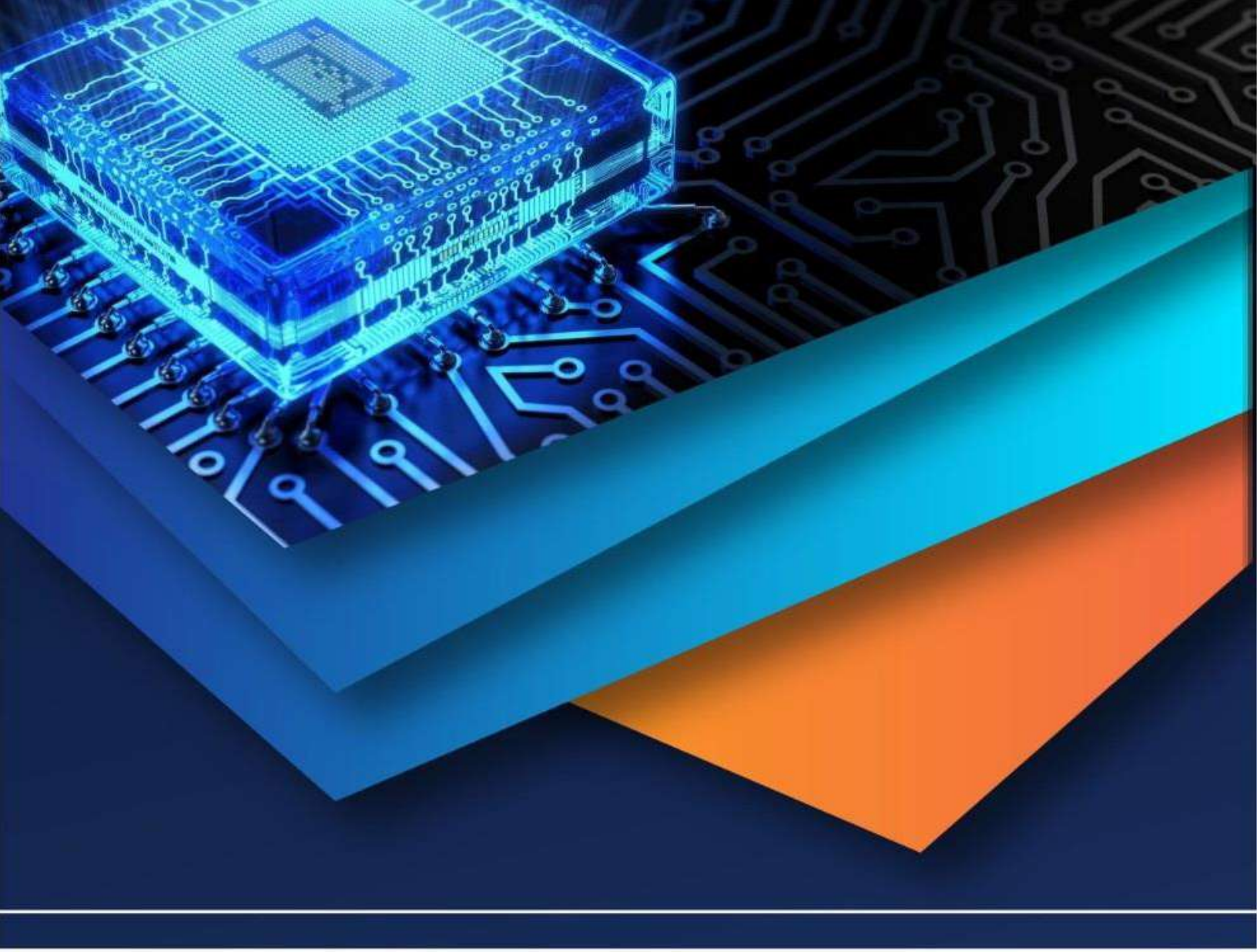

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