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Cryptocurrency Trading BoT Using Python

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Abstract: Our daily life has been merged online and they become more flexible and more effective. A huge growth in number of online users has activated virtual word concepts and created a new business phenomenon which is cryptocurrency to facilitate the financial activities such as buying, selling and trading.
Cryptocurrency represent valuable and intangible objects which are used electronically in different applications and networks such as online social networks, online social games, virtual worlds and peer to peer networks. The use of virtual currency has become widespread in many different systems in recent years.
At present, trading is done by human which is a hectic work. The first disadvantage is that we analyze the chosen cryptocurrency will rise or fall in value and buy or sell as per our strategies which is not accurate and efficient always, the second one is that we need to keep a watch every second to cope with loss, which is not possible for a human. We can use a bot that can trade by itself to maximize the profit. The bot function by taking the relative strength index (RSI) of the coin and calculates the selling price and buying price for the existing price. This can help the user to gain profit and be relaxed in the fluctuation period of the coin. These bots help capitalize on market opportunities and cut down time spent on monitoring.
Index Terms: Relative Strength Index (RSI), Profit, Fluctuation Period

I. INTRODUCTION

A. Purpose, Aim and Objectives

The main aim and purpose of this project is to build a bot which is capable and efficient in trading cryptocurrency compared to humans who trade manually. The following are some of the objectives of this project: In the world of cryptocurrency trading, crypto trading bots do the work of trading either one or multiple cryptocurrencies or, one or multiple platforms automatically on behalf of the owner or user. The bot decides how to perform trading based on Relative Strength Index (RSI) values of the coin. They are used to automate trading strategies and applied for purposes of amplifying trading profits.

B. Background of Project

Current research aims to create an efficient bot for cryptocurrency trading. In the current system, cryptocurrencies are known for their incredible volatility, with price fluctuating wildly even within minutes. Together, these factors limit the effectiveness of human cryptocurrency trading in several ways. Traders use bots to take advantage of cryptocurrency markets that are traded 24/7 around the world. The advantage of bots over investors is that they can react faster.

C. Scope of Project

Investors may not spend as much time on the cryptocurrency markets as they need to achieve the best deals. This requires 24/7 monitoring of cryptocurrency exchanges around the world. One of the two main solutions is a bot or automated tool that processes and executes transactions on behalf of human investors. Prices of cryptocurrencies like Bitcoin tend to vary somewhat from one exchange to another, and a bot that can move fast enough can outperform exchanges that delay price updates.

D. Modules Description

This project is composed of three main modules:

1) Cryptocurrency-Details: It is a trading platform that contains the entire details of thecrypto-currency necessary.
2) Buy-Sell: It shows which coin is being bought or sold at particular price.
3) Trade history: Finally, after buying or selling the coin, displaying the history of transactions, it shows us the profit. These are the various modules used in this system.

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II. II.LITERATURE SURVEY (BACKGROUND STUDY)

1) Title- Algorithmic trading bot[1]

This paper was published in the year 2021 by the authors Medha Mathur, Satyam Mhadalekar, Sahil Mhatre, Vanita Mane, proposed in this paper a trading bot that is coded using python. This python bot is feeded with data set from the past that consists of the open price, close price, high price, low price and date. This data set is trained using random forest regression model and trained is fed to the bot based on which it performs the trade.

2) Title-Predicting the direction of stock market prices using tree based classifiers:[3]

In this experiments, the time series data acquired is first exponentially smoothed. Then the technical indicators are extracted. Technical indicators provide insights to the expected stock price behavior in future. These technical indicators are used as features to train the classifiers. This model can be utilized for contriving new techniques for exchanging or to perform stock portfolio of the executives, changing stocks as per patterns expectation. The proposed model is without a doubt a novel method to limit the danger of interest in financial exchange by anticipating the profits of a stock more precisely than existing calculations applied up until 2019 but the prediction based on past data may not produce accurate profits.

3) Title-Deep Neural Network Based Stock Trading System Based on Evolutionary Optimized Technical Analysis Parameters[5]

In this paper, they presented a new stock trading and prediction model based on a MLP neural network utilizing technical analysis indicator values as features. Big data framework Apache Spark is used in implementation. The model is trained and tested on Dow 30 stocks in order to see the evaluate the model. The results indicate that comparable results are obtained against the baseline Buy and Hold strategy even without fine tuning and/or optimizing the model parameters. This paper produces only the prediction which again involves manual trading and not preferably applicable for crypto as in case of crypto the past data sets and patterns do not exactly produce the maximum profits.

III. METHODOLOGY

The proposed system for the cryptocurrency trading bot aims at overcoming the drawbacks of the existing system by developing a bot in python that performs trade based on the RSI indicators. The major drawback of the existing system is that it uses a pre-existing data set and performs based on the trends and patterns obtained based on the increase and decrease of prices. This may not accurately produce the best results while trading is performed. So to maximize the profits in the proposed system the bot is feeded with live data where parameters like close price, open price, high and low prices of the crypto are used from the live data to calculate RSI values based on which the trades are performed. The data

The system architecture is shown below:

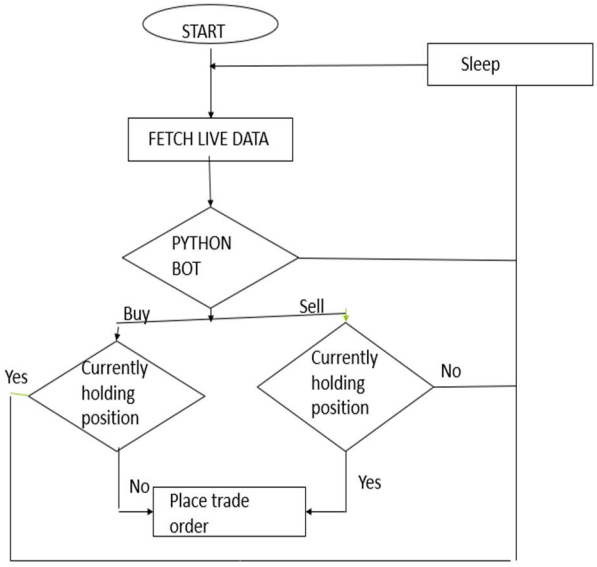


Fig (3.1) System Architecture

A. Hardware Requirements

1) 4 GB RAM
2) DualCore Processor
3) Internet Connection 3.1.2

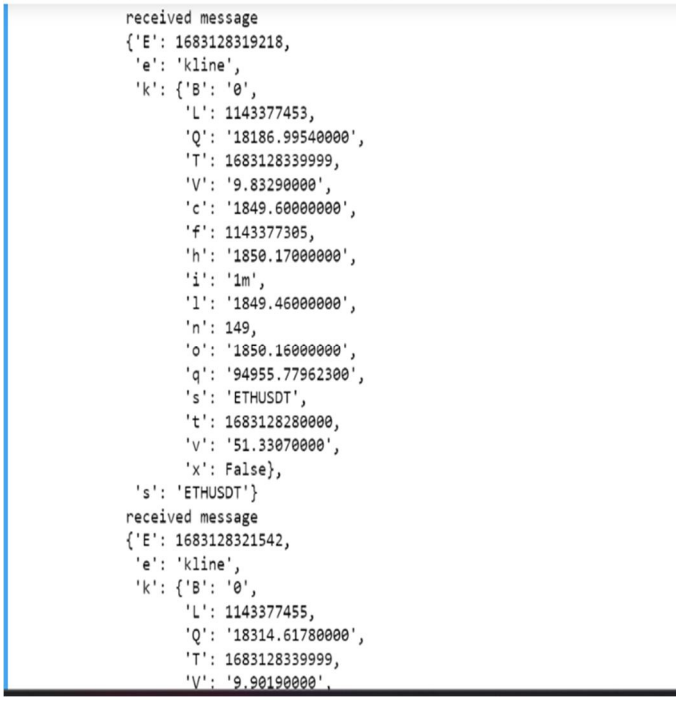
B. Software Requirements

1) Technology/Language: Python 3
2) API: Binance API
3) Browser: Any
4) Operating System: Windows
5) IDE: Python IDLE, Visual Studio Code 4

C. Data Set Information

Here live data set is used which is obtained through a websocket link and the binance API that displays the data when the code is executed which is the binance candlestick data from API. The data consists of various parameters like:

1) kline_ot = Kline Open Time
2) Open price
3) High price
4) Low price
5) Close price
6) Volume
7) kline_ct ==> Kline Close time
8) quote_volume ==> Quote asset volume
9) num_trades ==> Number of trades
10) base_volume ==> Taker Buy Base Asset Volume
11) quote_volume ==> Taker Buy Quote Asset Volume
12) kline_od ==> Kline Open Date
13) kline_cd ==> Kline Close Date



Fig(3.2) Binance candlestick stick from API

D. Python IDLE 3.8/ Jupyter Notebook

It is a visual code used for execution that is for compiling and running the given code and it displays the output. Jupyter Notebook is a free source code editor that fully supports Python and useful features such as real-time collaboration. Microsoft Python extension, is simple, fun, and productive. The extension makes JUPYTER an excellent Python editor, and works on any operating system with a variety of Python interpreters. It leverages all of Jupyter's power to provide auto complete and IntelliSense, linting, debugging, and unit testing, along with the ability to easily switch between Python environments, including virtual and conda environments. The Python extension supports code completion and IntelliSense using the currently selected interpreter. IntelliSense is a general term for a number of features, including intelligent code completion (in-context method and variable suggestions) across all your files and for built-in and thirdparty modules. IntelliSense quickly shows methods, class members, and documentation as you type, and you can trigger completions at any time with Ctrl+Space. You can also hover over identifiers for more information about them. Set breakpoints, inspect data, and use the debug console as you run your program step by step. Debug a number of different types of Python applications, including multi-threaded, web, andremote applications.

E. Binance API

Application programming interfaces, or APIs, allow companies to expose the data and functionality of their applications to other developers, partners, and internal companies. This allow s services and products to communicate with each other and use each other's data and functions through data communication. Developers do not need to know how to use the API; they only use the interface to communicate with other products and services. The use of APIs has gr own over the last decade to the point where today's most popular web applications can't do withhout them. This is a method that allows you to connect to Binance servers via Python or a fe w other programming languages. You can automate your work with it. More specifically, Binance has a RESTful API that uses HTTP requests to send and receive data. Cryptocurrency exchanges also have APIs. Traders can use these APIs to provide trading data to trading bots, allowing them to trade on their behalf (by placing orders). This form of trading is called algorithmic trading (or robot trading)

F. Config Module

This module allows a hierarchical configuration scheme with support for mappings and sequences.

G. WEBSOCKET

A WebSocket may be a standard convention for two-way information exchange between a client and server. The WebSockets convention does not run over HTTP, instep it could be a isolated usage on beat of TCP. WebSocket association permits full-duplex communication between a client and server so that either side can push data to the other through an set up association. The reason why WebSockets, in conjunction with the related advances of Server-sent Occasions (SSE) and WebRTC information channels, are important is that HTTP isn't implied for keeping opena association for the server to as often as possible thrust information to a web browser. Both the internet browser and the server must execute the WebSockets convention to set up and keep up the association. There are critical suggestions for servers since WebSockets associations are long lived, not at all like commonplace HTTP associations. A multi-threaded or multi-process based server cannot scale fittingly for WebSockets since it is outlined to open a association, handle a ask as rapidly as conceivable and after that near theassociation

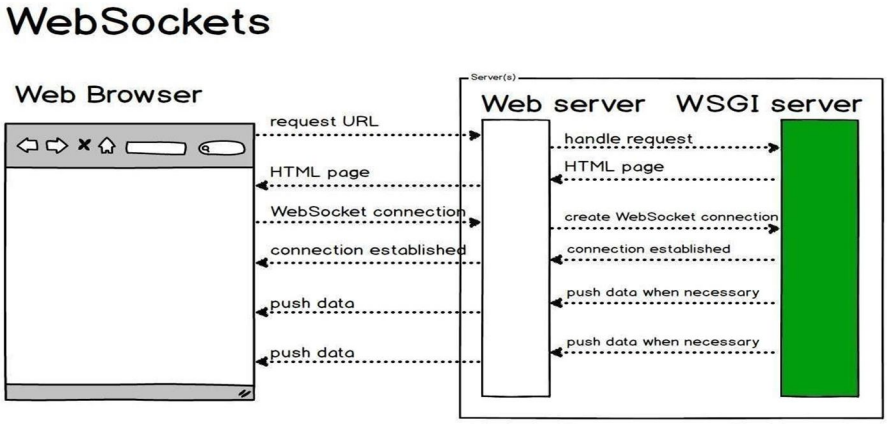


Fig (3.4) websocket connection

H. UML Diagrams

Unified Modeling is a modeling language for expressing, visualizing, designing and documenti ng systems, and its object is a language that provides the expression and structure of semantics and rules. UML focuses on the conceptual and physical representation of systems. Captures th e decisions and understanding of the system to be implemented. It is used to understand, create, organize and manage information about the system. As the culture evolves, some of these arti facts receive more or less treatment than other. This work is not only the output of the project, but also the output of the project. They are also important for management, measurement and communication during development and after deployment. UML deals with the documentation of the system architecture and all its elements. UML also provides guidelines for requirements and tests. Finally, UML provides a language for project planning and project management.

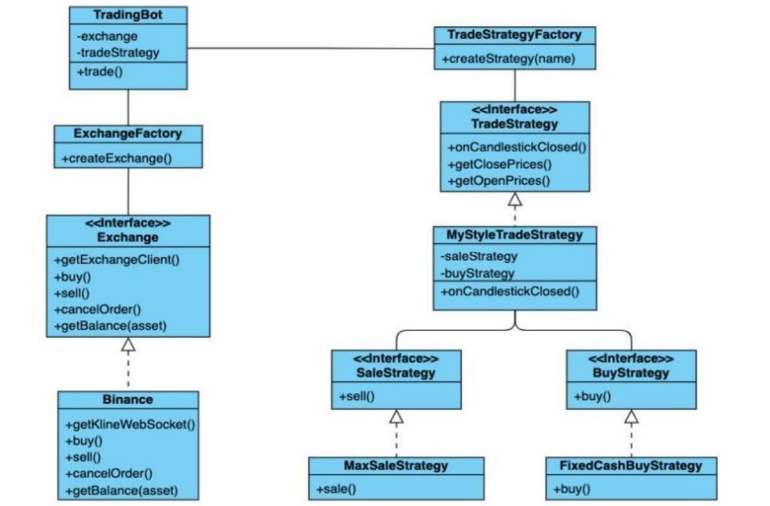


Fig (3.5) Class diagram

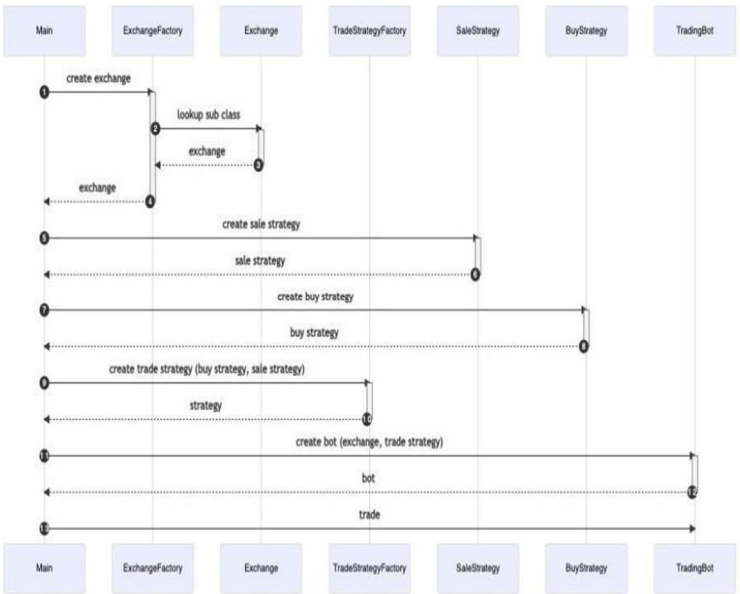


Fig (3.6) Sequence diagram

I. Evaluation Metrics

1) RSI Value

RSI which means relative strength index measure the speed and change of price movements of the cryptocurrency. This value oscillates between 0 and 100. It is calculated with the formula in which first the average gain over average loss for a period is calculated.

$$RSI = 100 - \left[\frac{100}{1 + \frac{n_{up}}{n_{down}}} \right]$$

where:
n_{up} = average of n-day up closes
n_{down} = average of n-day down closes
(most analysts use 9 - 15 day RSI)

Fig (3.7) RSI formula

This RSI value when falls below 30 the crypto is purchased and when risen above 70 the crypto is sold.

2) Overbought

It is said when the market has risen sharply and a possibility of decline of price further, so it is when the crypto is sold when RSI reaches to 70 and a condition of overbought is given.

3) Oversold

It is said when the market has fallen sharply and a possibility of rise in the price of crypto, so it is when the crypto is bought leading to the condition oversold when RSI reaches below 30.

IV. CONCLUSION

In conclusion, the trading bot uses RSI indicators to perform the trades. The conditions of overbought and oversold are used to indicate the rsi value obtained can be used for buying or selling. Thus, this proposed system perform better trades making to easier to maximize profits and reducing the stress of manual trading. This can further be extended to a bot which can perform trades that maximizes the profits and reduces the losses incurred and can also be further extended to perform trades of multiple crypto currencies simultaneously.

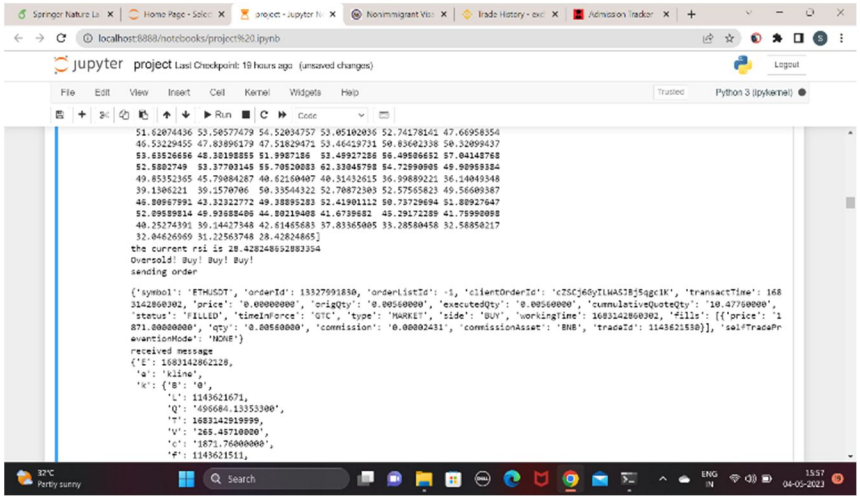


Fig (3.8) Performing a trade

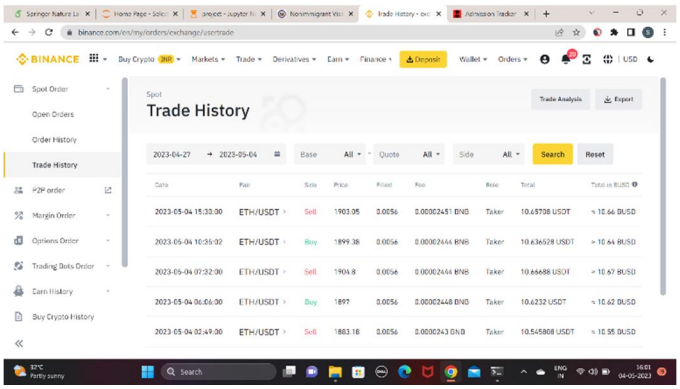


Fig (3.9) Binance Platform trade history

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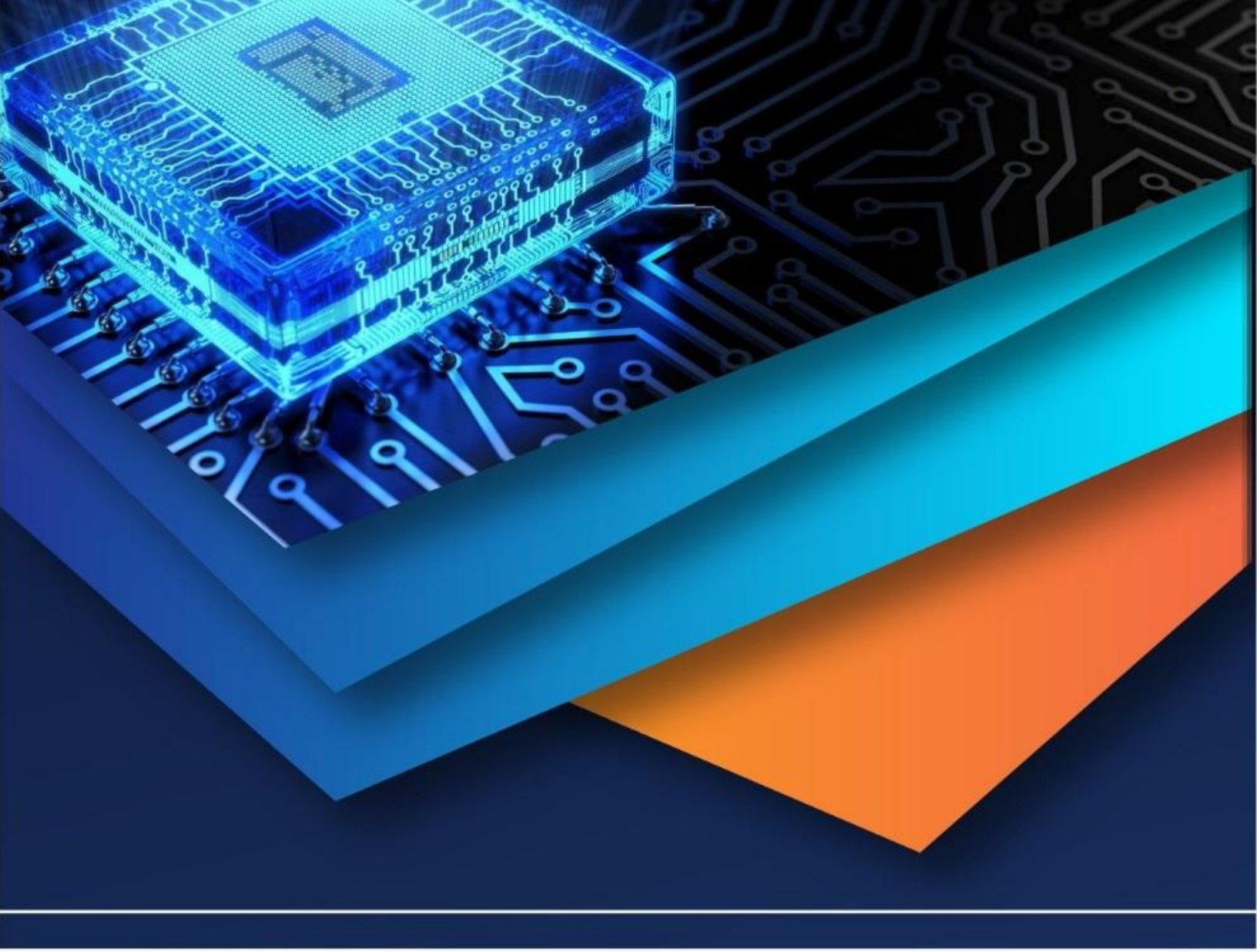

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